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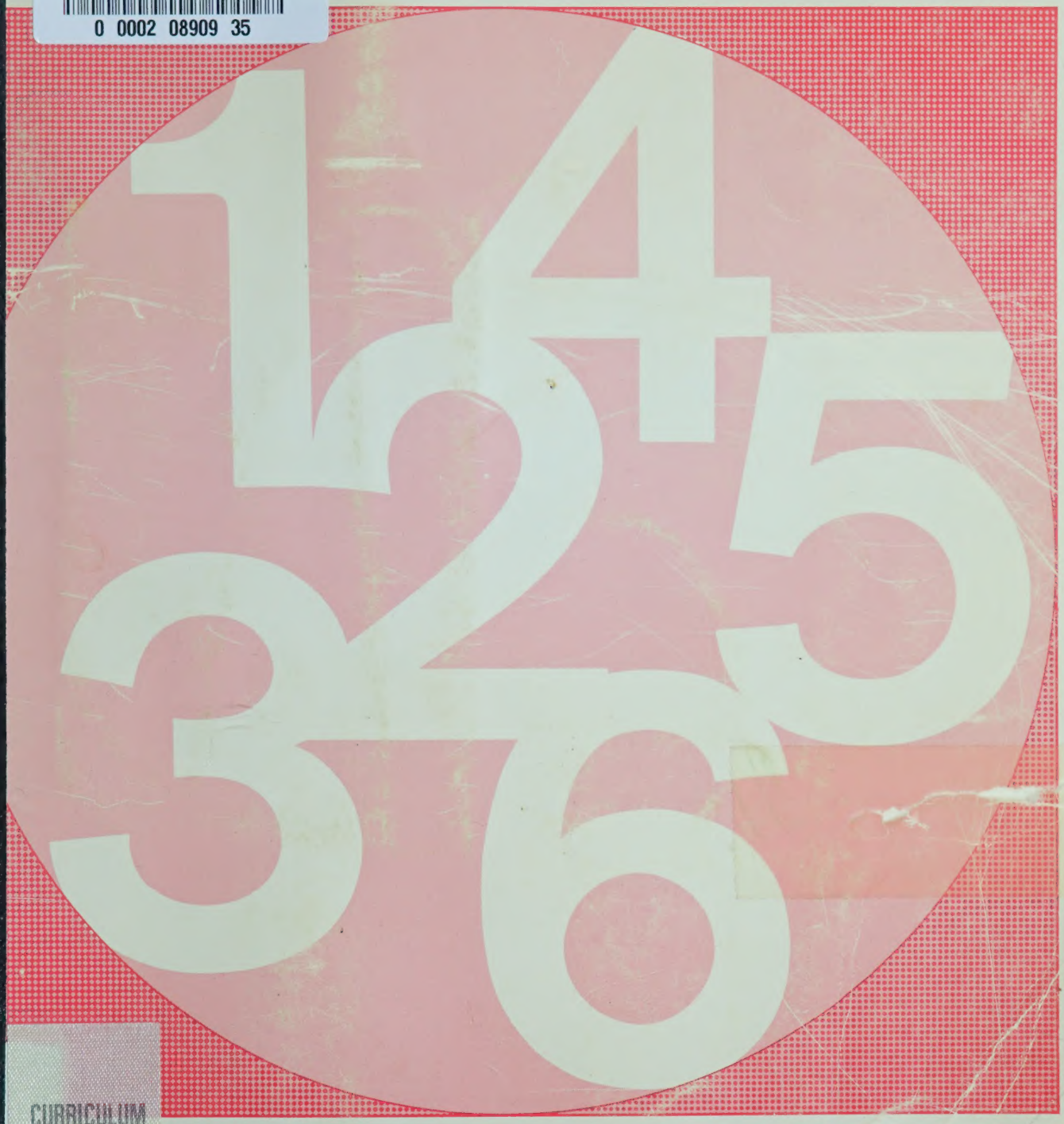

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SRA
MATHEMATICS
LEARNING SYSTEM

SUPPLEMENTARY ACTIVITIES

prepared
by

William Bober

Supervisor of Mathematics
Edmonton Catholic School District

Canadian Consultant
MATHEMATICS LEARNING SYSTEM

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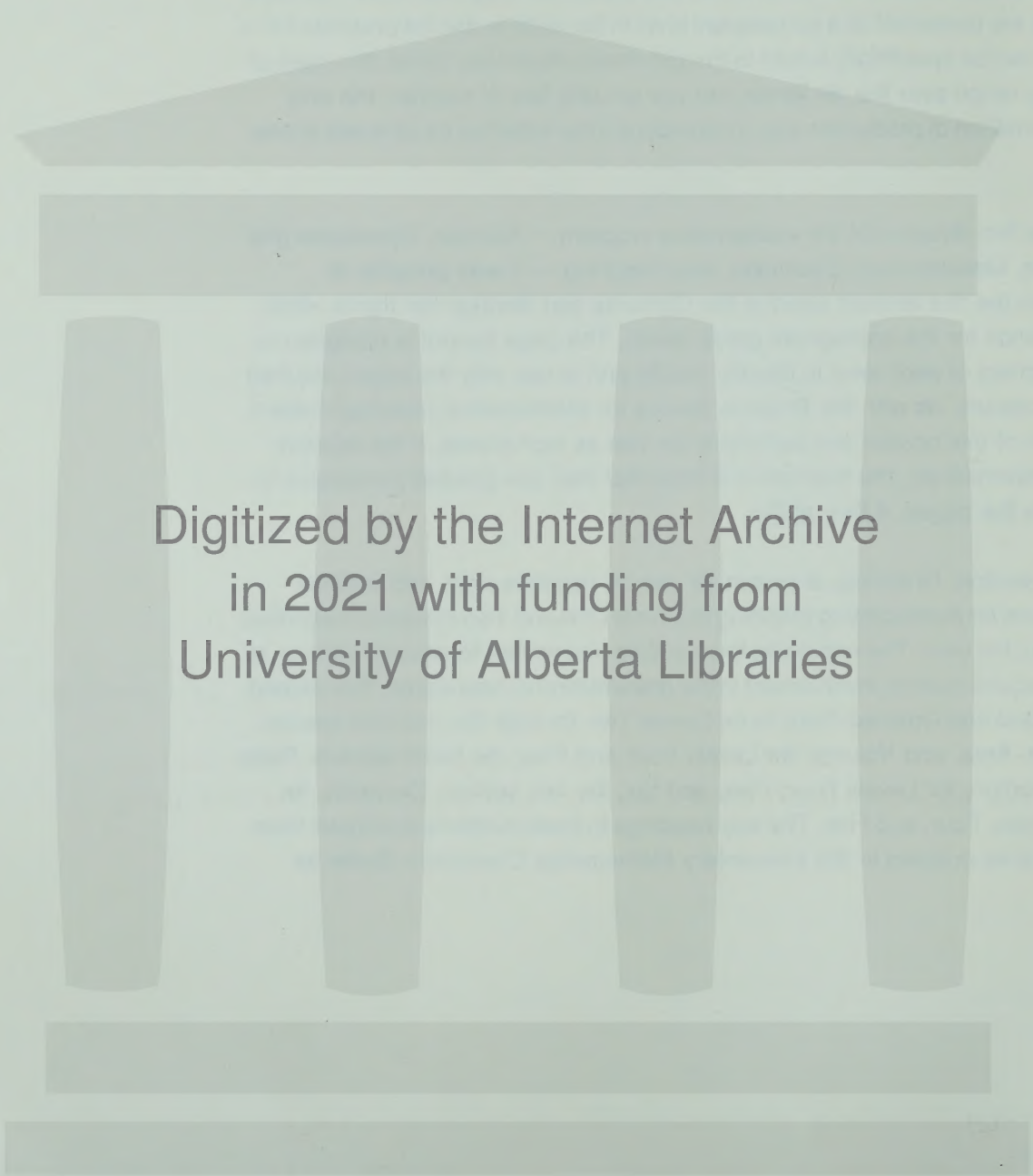
INTRODUCTION

This booklet has been designed to provide supplementary instruction and activities for those areas of difference between the Alberta Elementary Mathematics Curriculum Objectives and the presentation of content in the texts of *Mathematics Learning System*, Levels One to Six. From correlation charts prepared by three provincial school boards, we determined that the differences exist either because the topics are presented at a subsequent level in the texts or are not presented in a way that can be specifically linked to the provincial objectives. Since the areas of difference range over the six levels, but are actually few in number, the only practical method of production was to incorporate the activities for all levels in one booklet.

Within the five divisions of the mathematics program — Number, Operations and Properties, Measurement, Geometry, and Graphing — it was possible to distinguish the five strands listed in the Contents and develop the topics within those strands for the appropriate grade levels. The page lay-out is designed to allow teachers of each level to identify readily and to use only the pages required for their classes. As with the Practice Sheets for *Mathematics Learning System,* the pages of this booklet are perforated for use as worksheets, if the teacher wishes. Alternatively, the teachers will note that they are granted permission to reproduce the pages, if they prefer.

The first section, Graphing, is written for use by teachers only, and outlines suggestions for incorporating graphing in Levels One and Two classroom activities throughout the year. The remaining four sections are written for student use but, of course, require teacher involvement in the presentation of new topics. The second section, Grid and Ordered Pairs, is for Levels Two through Six; the third section, Perimeter, Area, and Volume, for Levels Four and Five; the fourth section, Ratio and Proportion, for Levels Four, Five, and Six; the last section, Decimals, for Levels Three, Four, and Five. The sub-headings in these sections are drawn from the objectives outlined in the Elementary Mathematics Curriculum Guide for Alberta.



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GRAPHING

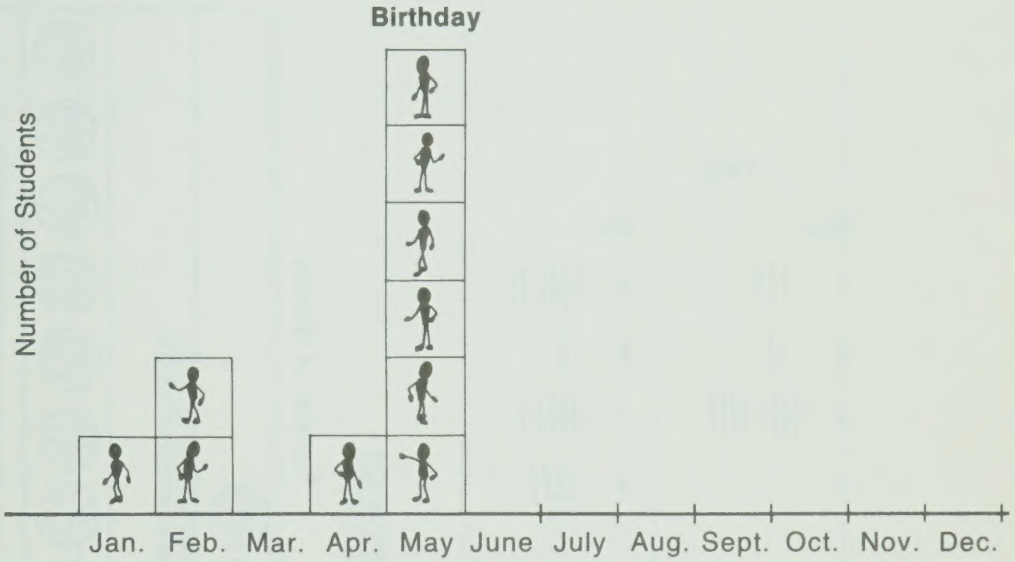
Pictographs

There are many classroom activities which you can undertake to help students grasp the concept of graphic representation of data.

1. Ask your students to form groups according to their month of birth. Make a tally chart showing the number of students who have their birthdays in each month. Using the chalkboard, or bristol board, construct a pictograph of the collected data.

Tally

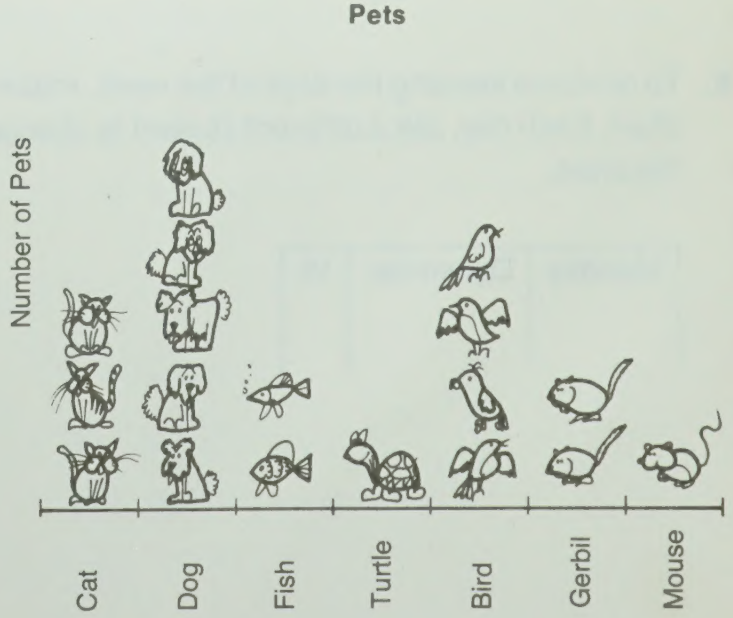
Jan.	|	July	
Feb.	||	Aug.	
Mar.		Sept.	
Apr.	|	Oct.	
May	𝍸 |	Nov.	
June		Dec.	



2. Start a class discussion about pets. List the pets which your students have or like, and make a tally chart. Construct a pictograph from the data, using pictures or drawings of each type of pet.

Tally

Cat	|||
Dog	𝍸
Fish	||
Turtle	|
Bird	||||
Gerbil	||
Mouse	|

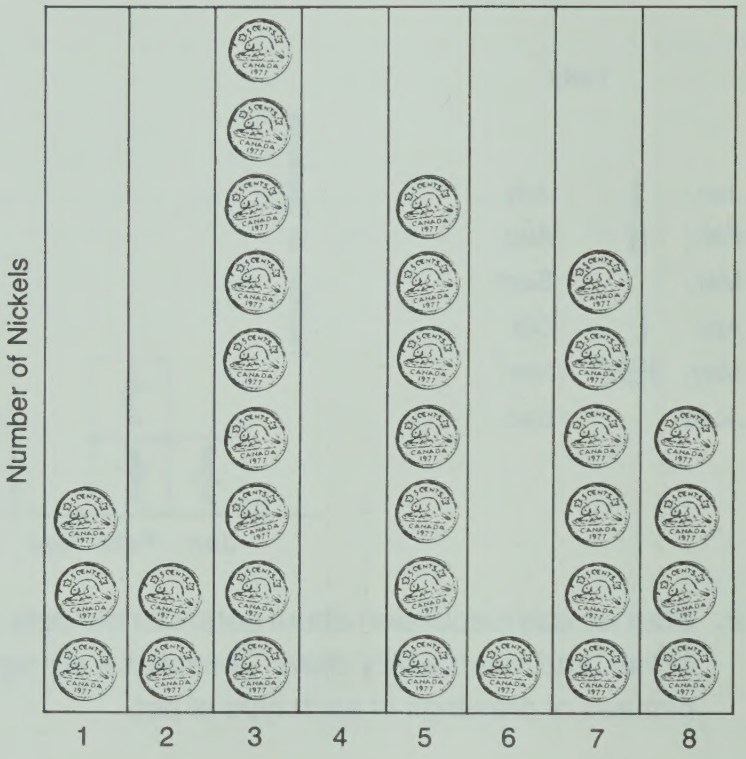


3. Have the students cut out squares from coloured construction paper. Then prepare a tally chart of the number of students who like a particular colour. Arrange the tally information in pictograph form.

4. When you are working with the concept of money and measurement, you can include graphing activities such as this. Obtain eight boxes and number them 1 to 8. Place varied amounts of nickels in each box. Have the children prepare a pictograph representing the number of nickels in each box. Then have the children read their graphs, counting by five. You might repeat the activity using dimes or quarters.

Tally

Box		Box	
1	𝍸 |||	5	𝍸 ||
2	||	6	|
3	𝍸 |||	7	𝍸 |
4		8	|||

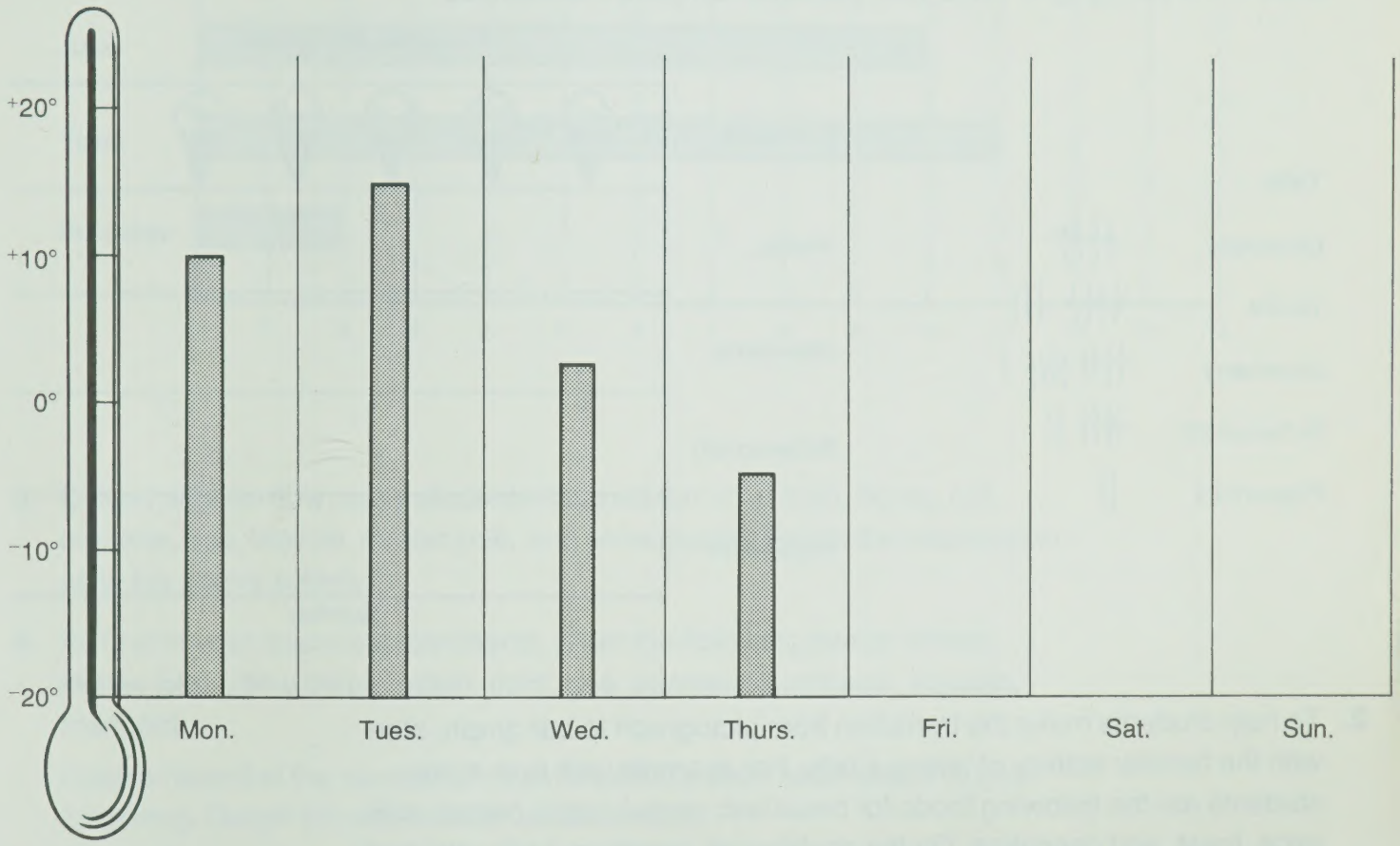


5. To reinforce learning the days of the week, make a "Day-Month-Date" chart. Each day, ask a different student to change the day,month, and date on the chart.

Monday	December	15

6. To introduce the Celsius temperature and to teach the days of the week, set up an outdoor thermometer. When the children arrive for school, ask one of them to read the thermometer. Record the temperature for each day of the week. Try to include Saturday and Sunday.

If there is no place in your classroom to accommodate an outdoor thermometer, you may wish to construct one from cardboard with a movable red strip to indicate temperature changes. The necessary data can be obtained from weather broadcasts or newspaper clippings.



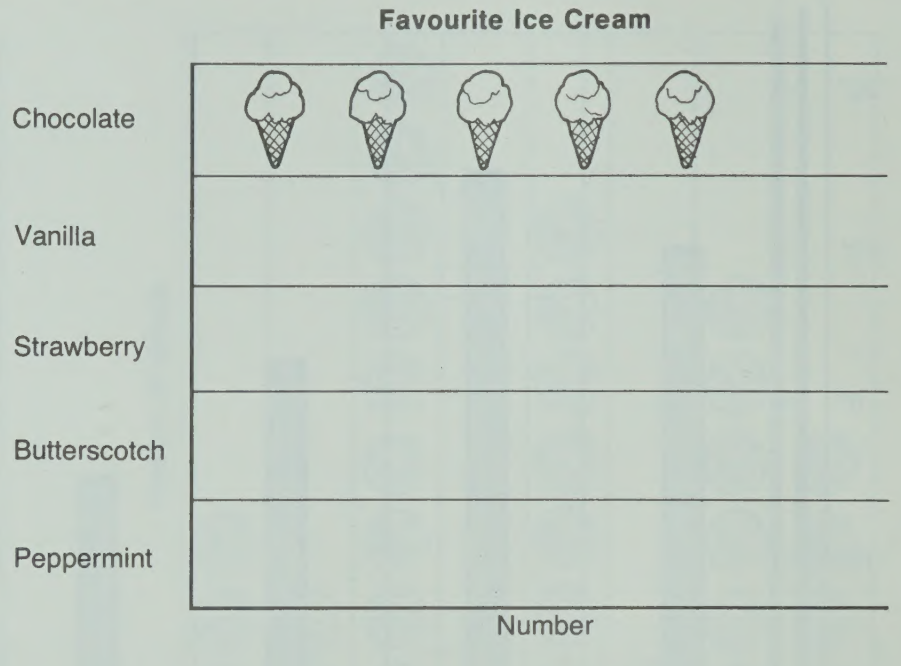
Bar Graphs

1. In Grade 1, students have learned to collect data and assemble it in pictograph form. Before you introduce your Grade 2 students to the bar graph, review the construction of the pictograph.

On the chalkboard, draw cones of various colours to represent different flavours of ice cream: a brown cone for chocolate, white for vanilla, pink for strawberry, yellow for butterscotch, and green for peppermint. Tally the number of students who like a particular flavour. Construct and label the axes of the pictograph. Have your students complete the exercise.

Tally

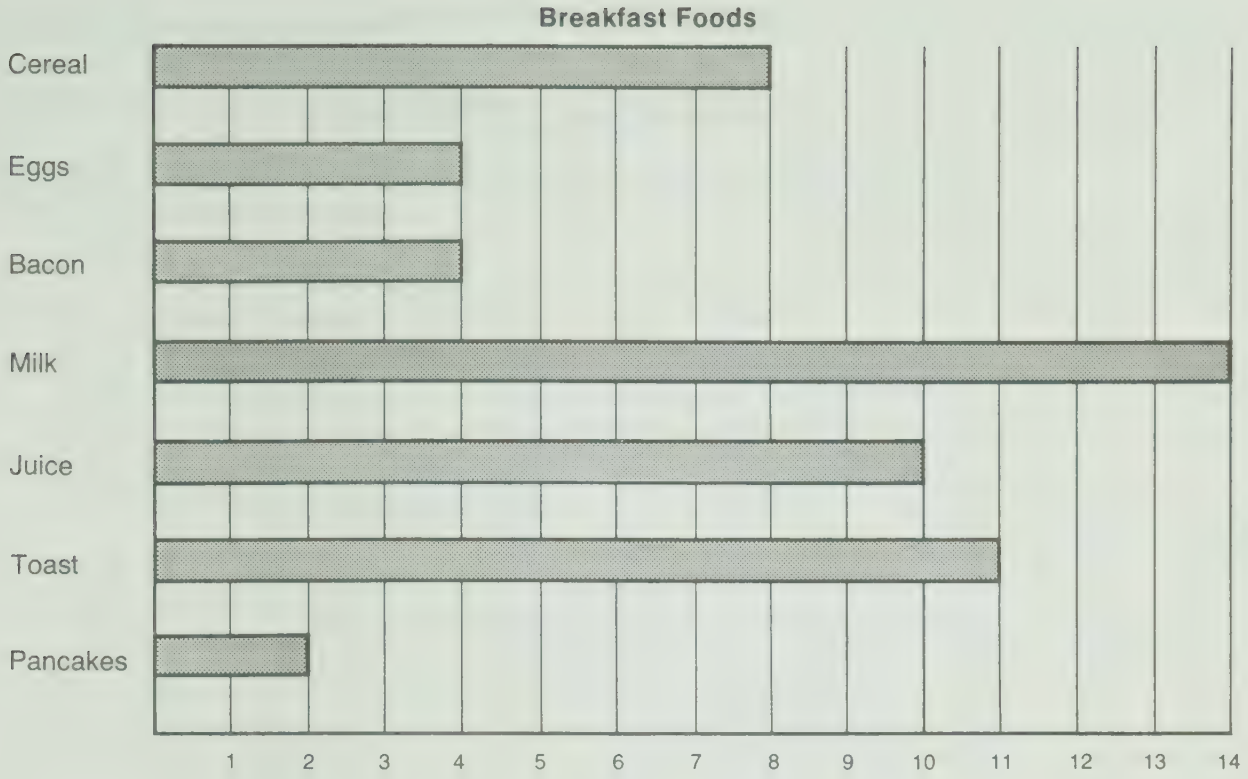
Chocolate	𝍸
Vanilla	𝍸 |||
Strawberry	𝍸 𝍸 |
Butterscotch	𝍸 ||
Peppermint	||



2. To help students make the transition from pictograph to bar graph, start with the familiar activity of taking a tally. For example, ask how many students ate the following foods for breakfast: cereal, eggs, bacon, milk, juice, toast, and pancakes. On the chalkboard, construct horizontal and vertical axes. Number the horizontal axis. On the vertical axis list or draw each item of food. Then represent the tally information in a bar graph.

Tally

Cereal	𝍸 ||	Juice	𝍸 𝍸
Eggs	|||	Toast	𝍸 𝍸 |
Bacon	|||	Pancakes	||
Milk	𝍸 𝍸 |||		



3. Collect data on how many students have ridden on a: train, horse, car, airplane, bus, bicycle, motorcycle, and snowmobile. Graph the information as in the above activity.

4. As one of your science experiments, plant the following seeds: wheat, kidney bean, lima bean, radish, corn, pea, pumpkin, sunflower, squash, marigold.

   Keep a record of the number of days it takes for each seed sprout to grow 1 cm long. Graph this information for each seed.

5. Take a survey of your school to find the number of students in each grade from Grades One to Six. Graph this information.

6. Give the students information of the following nature and have them prepare a bar graph.

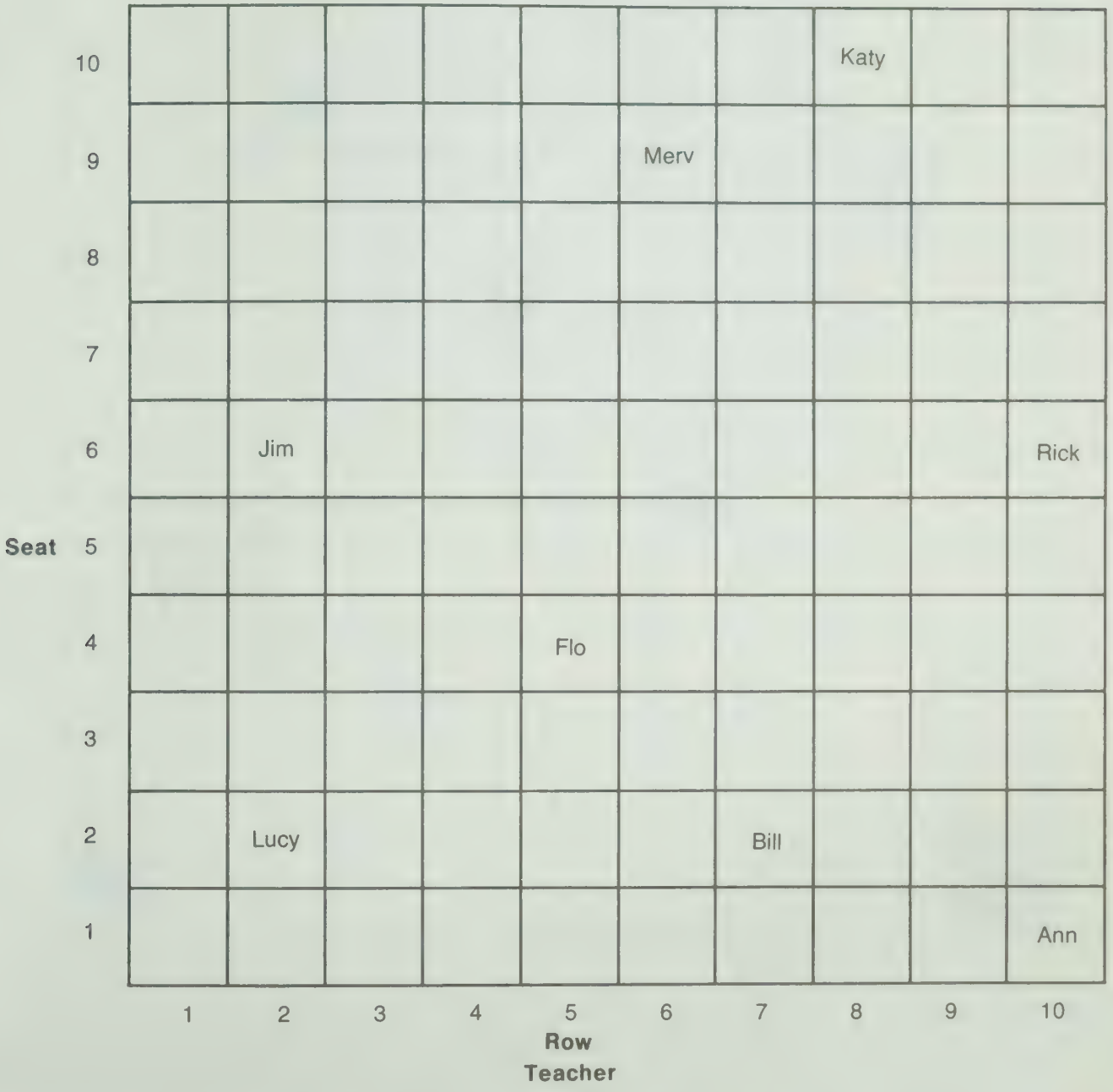
On a bird-watching trip, the watchers made the following observations:

Kind of Bird	Number Seen
sparrows	3
starlings	15
robins	2
crows	6
blue jays	1
ducks	12
magpies	1
orioles	1
chickadees	5

GRID AND ORDERED PAIRS

Locating Objects on a 10 by 10 Grid

1. The 10 by 10 grid below shows the seats in a large classroom. Some children have arrived early.

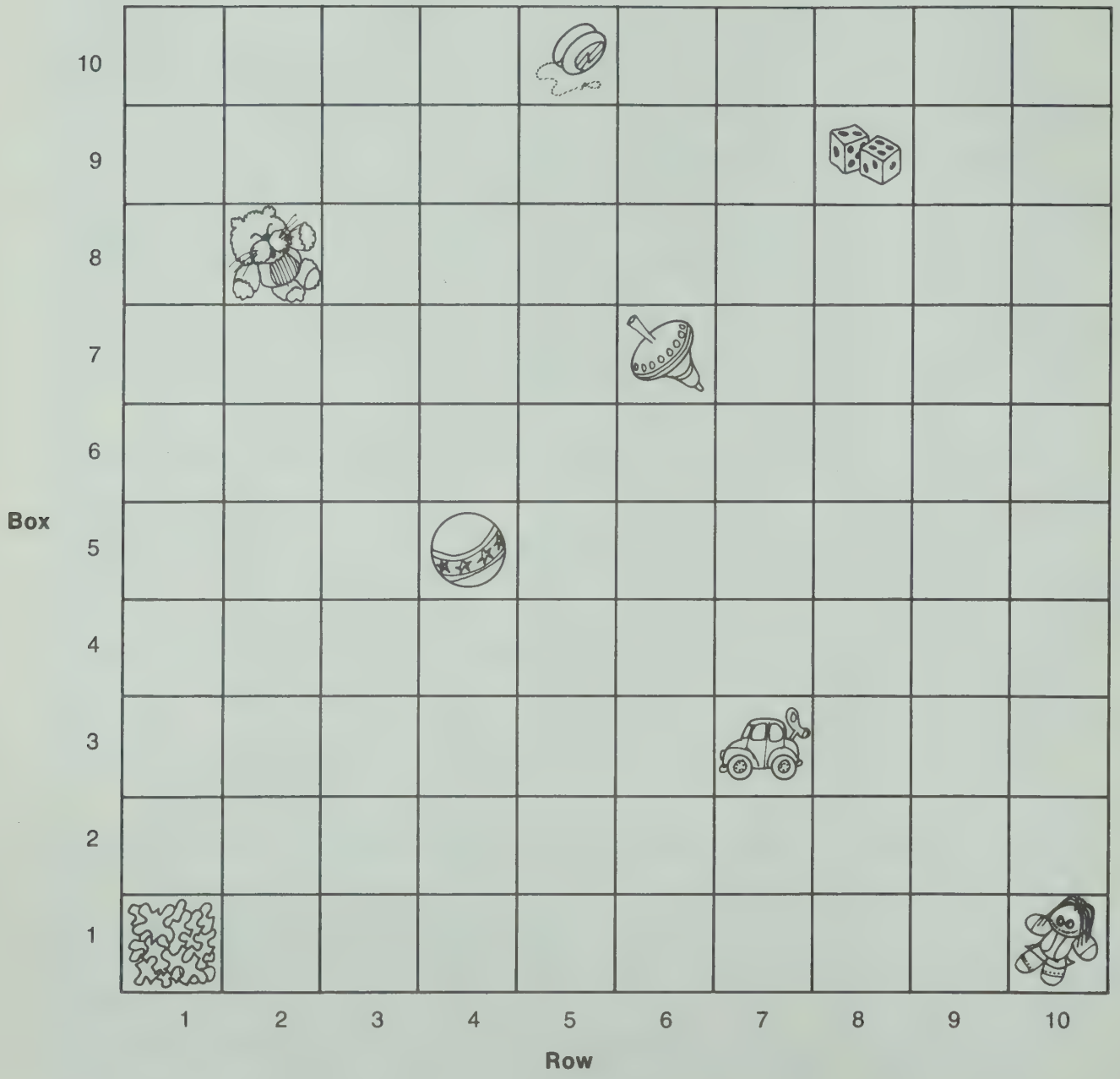


Name the seat where each girl or boy sits. Give each location as an ordered pair.

Katy _____ Bill _____ Lucy _____ Rick _____

Jim _____ Ann _____ Merv _____ Flo _____

2. Some toys are packed in a 10 by 10 grid box. When the top is lifted off the box, you can see where each toy is.

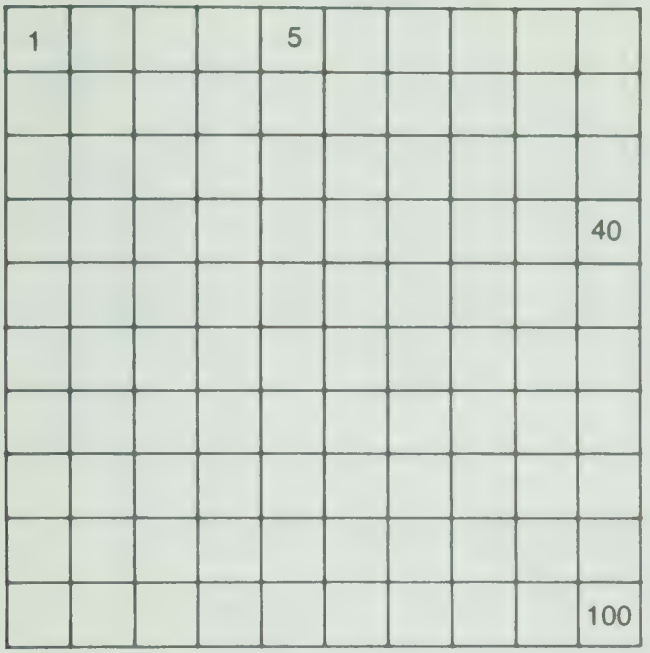


Name the row and the box where each toy can be found.

top _____ puzzle _____ lion _____ doll _____

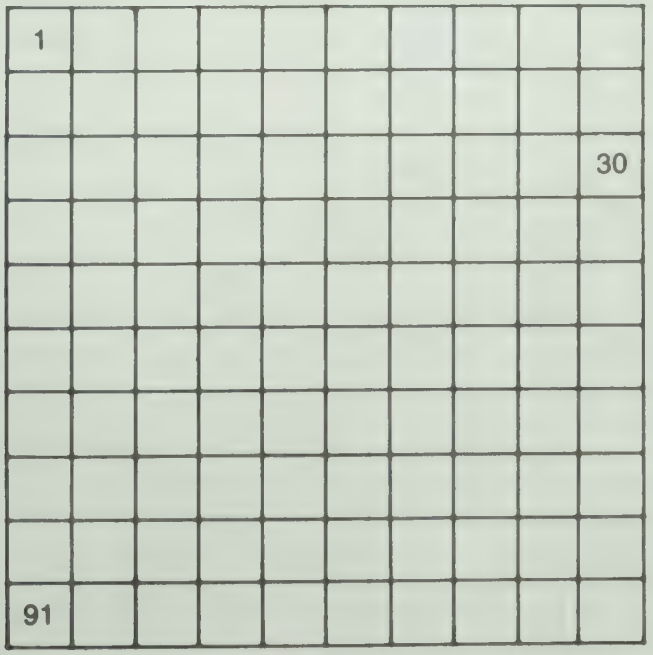
car _____ dice _____ ball _____ yo-yo _____

3. You can write the numbers from 1 to 100. On the 10 by 10 grid below, locate these numbers in their correct places:
20, 36, 47, 55, 6, 83, 38, 98, 61, 90.



4. Place these numbers in the correct places on the 10 by 10 grid:

a all the multiples of 5.
b all the multiples of 10.
c one more than 70, 13, 27, 78.
d one less than 60, 23, 89, 100.



Coordinates, Ordered Pairs, and Plotting Points

1. Mr. Smith is a great mathematics teacher, but he cannot remember names. He calls on his students by where they sit in the classroom.

Seating Plan

	Row 1	Row 2	Row 3	Row 4
Seat 4	Ron	Jim	Juanita	Laura
Seat 3	Jack	Claire	Lisa	Patty
Seat 2	Karen	Larry	John	Oliver
Seat 1	Lynn	Dave	Julie	Tony

When he calls on Patty, he says, "Row 4, Seat 3," or just (4, 3).

a Where do these students sit?

Jim _____ Oliver _____ Jack _____ Karen _____

b If Claire and John change places, what is Claire's new location?

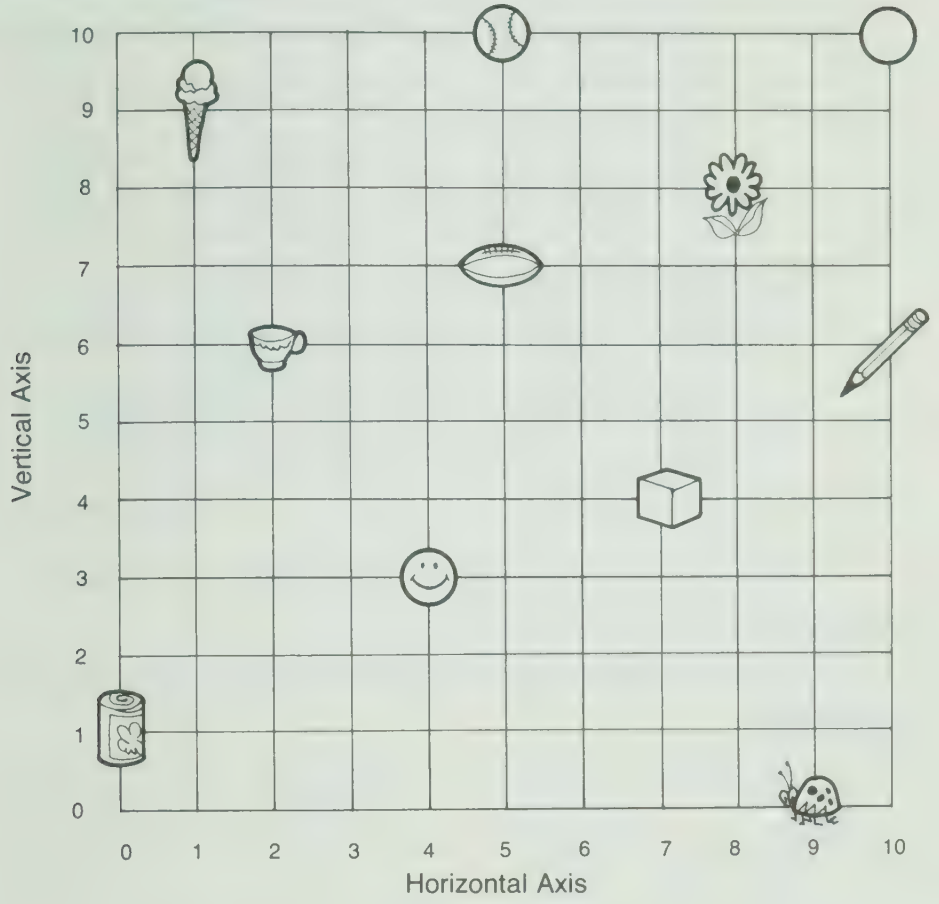
_____

c Who sits in the following places?

(4, 3) _____ (1, 4) _____ (4, 1) _____

(1, 1) _____ (3, 3) _____

2. Write the location of each object on the 10 by 10 grid below. Use the horizontal axis number first and the vertical axis number next. For example, the cup is located at (2, 6).

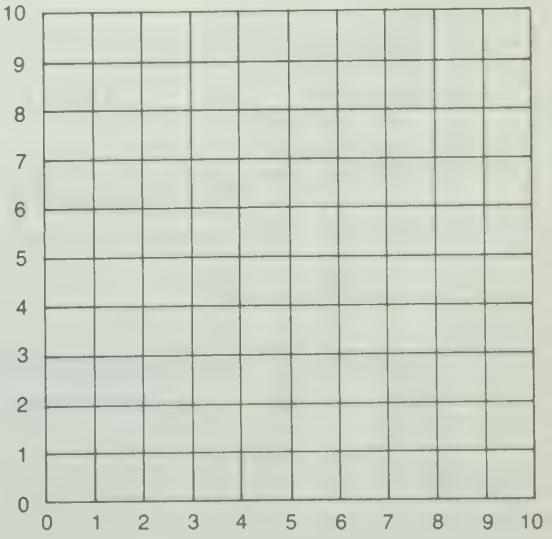


circle	_____	ice cream	_____	cube	_____	pencil	_____
happy face	_____	football	_____	baseball	_____		
bug	_____	can	_____	flower	_____		

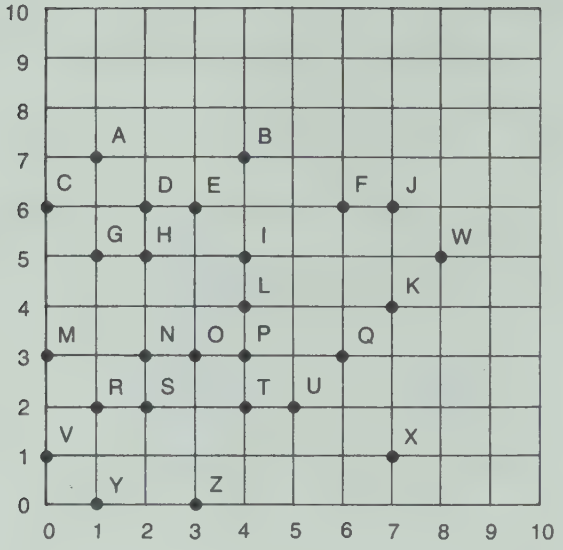
3. On the grid, locate the following points and join them in the order shown:

(6, 10) → (7, 9) → (7, 8) → (9, 7) →
(7, 7) → (8, 5) → (9, 4) → (8, 4) →
(8, 3) → (7, 3) → (8, 2) → (8, 1) →
(6, 1) → (6, 0) → (3, 0) → (3, 2) →
(1, 4) → (1, 8) → (2, 10) → (6, 10) →

What picture do you get?



4.



All the letters of the alphabet are used to name points on the grid. Use the grid to find the names spelled by the number pairs.

Here's how:

(4, 3) (1, 7) (4, 2)

P A T

a (1, 2) (3, 6) (7, 1) (0, 3) (4, 5) (4, 4) (1, 0)

_____ _____ _____ _____ _____ _____ _____

(6, 6) (1, 2) (1, 7) (2, 3) (4, 3) (3, 6) (2, 6) (1, 2) (3, 3)

_____ _____ _____ _____ _____ _____ _____ _____ _____

b Write each name using number pairs.

James _____ _____ _____ _____ _____

Cathy _____ _____ _____ _____ _____

George _____ _____ _____ _____ _____ _____

Your first name _____

c What has a hump, is brown, and lives at the North Pole?
To solve the riddle, write the letter for each number pair.

(1, 7) (4, 4) (3, 3) (2, 2) (4, 2) (0, 6) (1, 7) (0, 3) (3, 6) (4, 4)

_____ _____ _____ _____ _____ _____ _____ _____ _____ _____

Generating Ordered Pairs: Whole Numbers

Obtain four different kinds of balls (for example: golf, table tennis, tennis, baseball, spongeball). Then with the help of a partner, follow these steps:

1. Tape a metre-stick to a wall with its base at floor level.
2. For each ball, make out a form like this:

Drop Height	Bounce Height	Ordered Pair

3. Choose a ball. One person drops the ball from a certain height. The other person reads off the bounce height. Measure to the nearest centimetre.
4. Choose four different drop heights. Record each drop height and corresponding bounce height on your form.
5. Repeat for three other balls.
6. To complete each chart, list the drop and bounce heights as ordered pairs:

Suppose you obtained these two charts from your experiment:

Drop Height	Bounce Height	Ordered Pair
10	5	(10, 5)
18	9	(18, 9)
26	13	(26, 13)
30	15	_____
48	_____	_____
60	_____	_____

What number would you expect in the right column across from 48? _____ from 60? _____. Write the rest as ordered pairs.

Drop Height	Bounce Height	Ordered Pair
30	60	(30, 60)
20	40	_____
80	160	_____
50	_____	_____
90	_____	_____
60	_____	_____

What number would you expect in the right column across from 50? _____ from 90? _____ from 60? _____. Write the rest as ordered pairs.

Practice

Complete each table.

1.

1	4	(1, 4)
2	5	(2, 5)
3	6	_____
4	____	_____
6	n + 3	_____

2.

0	6	(0, 6)
1	7	(1, 7)
2	8	_____
3	____	_____
n	n + 6	_____

3.

9	8	(9, 8)
12	11	(12, 11)
25	24	_____
50	____	_____
51	____	_____
n	n − 1	_____

4.

1	6	(1, 6)
3	____	_____
5	30	(5, 30)
7	42	_____
9	____	_____
n	____	_____

5.

3	1	(3, 1)
6	2	(6, 2)
9	3	_____
12	____	_____
18	____	_____
n	____	_____

6.

0	____	_____
10	____	_____
20	____	_____
30	____	_____
40	241	(40, 241)
n	6n + 1	(n, 6n + 1)

7.

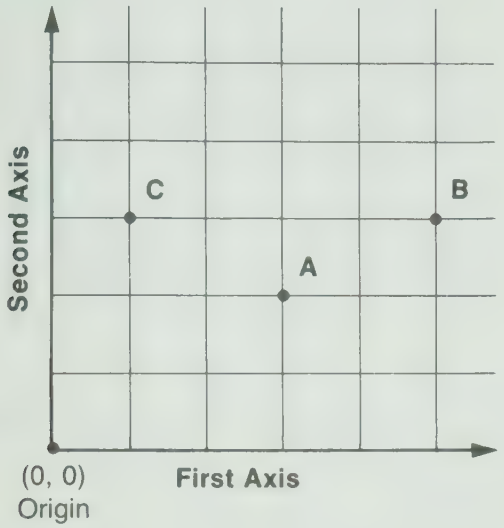
n	n + 3	(n, n + 3)
____	8	_____
____	14	_____
3	____	_____
7	____	_____
15	____	_____

8.

n	n ÷ 3	(n, n ÷ 3)
____	8	_____
____	5	_____
____	2	_____
21	____	_____
48	____	_____

Writing Coordinates as Ordered Pairs

You can use the grid below to locate points A, B, and C. First, choose a starting point on the grid and label it (0, 0) or 0. This starting point is called the **origin.** From the origin draw a horizontal line to the right and label it "first axis." Extend a vertical line up from the origin and label it "second axis."



To locate point A, start at the origin. Count 3 squares to the right, and 2 squares up. Write the location of point A as (3, 2).

How many to the right?	How many up?
3	2
(3, 2)	

Where is point B located? _____

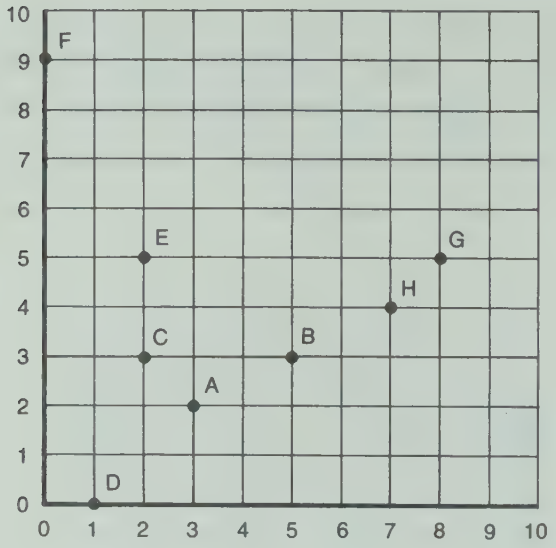
Pairs of numbers like (3, 2) and (5, 3) are called **ordered pairs.** The order of the numbers inside the brackets is important.

What ordered pair locates point C? _____ Do the ordered pairs (3, 2) and (2, 3) locate the same point? _____

Remember, always start at the origin (0, 0). The first number of an ordered pair tells how far to go to the right. The second number tells how far to go up.

Practice

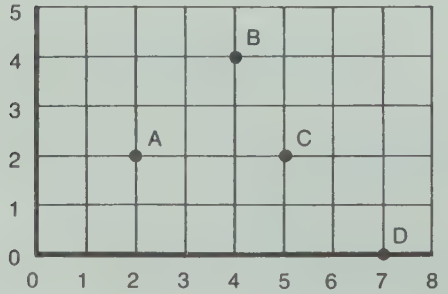
1.



Complete this chart using the grid.

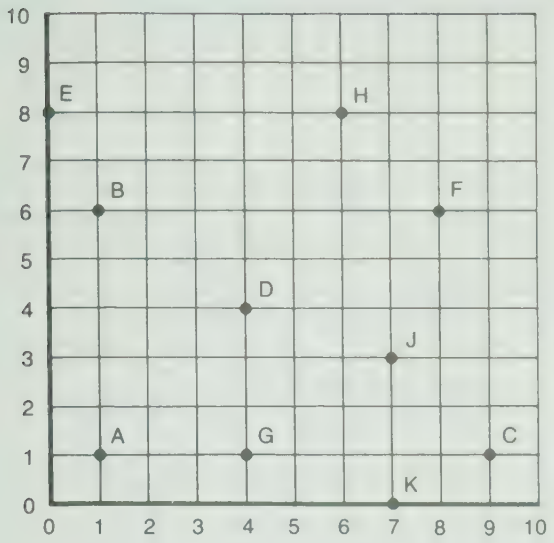
Point	How far to the right?	How far up?	Ordered Pairs
A	3	2	(3, 2)
B	5	____	(5, 3)
C	____	3	(2, 3)
D	1	0	(____, 0)
E	2	5	(2, ____)
F	0	____	_____
G	8	____	_____
H	____	____	_____

2. Complete this chart using the grid.



Point	How far to the right?	How far up?	Ordered Pairs
A	_____	_____	_____
B	_____	_____	_____
C	_____	_____	_____
D	_____	_____	_____

3.



a Name the ordered pair for each of the following points on the grid.

A _____ B _____ C _____ E _____

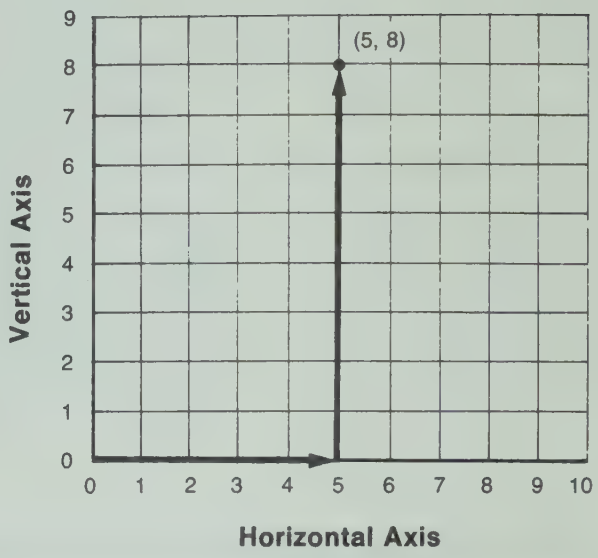
b Name the point on the grid for each of the following ordered pairs.

(7, 3) _____ (6, 8) _____ (7, 0) _____ (8, 6) _____

Graphing Ordered Pairs

The following steps should be taken to graph ordered pairs:

1. Mark the origin.
2. Draw the horizontal axis.
3. Draw the vertical axis.
4. Number each axis.
5. Locate each ordered pair on the graph.



Practice

1. Draw horizontal and vertical axes on graph paper. Number each axis from 1 to 12. Mark and label the following points:

   A (1, 3) B (8, 3) C (2, 3) D (5, 3) E (7, 3)
   F (9, 3) G (4, 3) H (11,3) I (0, 3)

2. On the same sheet of paper, mark and label the following points:

   J (7, 0) K (7,1) L (7, 2) M (7, 3) N (7, 4)
   P (7, 5) Q (7, 6) R (7, 7) S (7, 10)

3. Graph each set of ordered pairs. Then connect the points.

   a (0, 1) (16, 1) (2, 1) (14, 1) (4, 2) (12, 2)
   (6, 4) (10, 4) (7, 6) (9, 6) (8, 9)

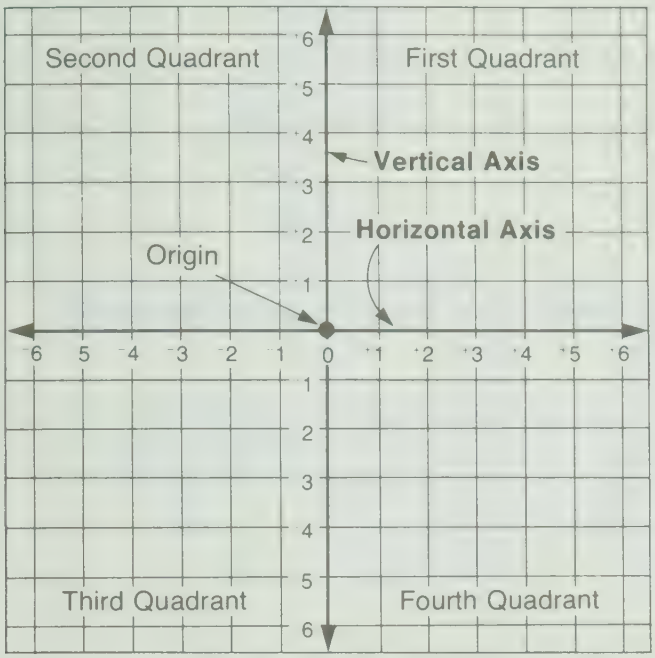
   b (1, 2) (5, 4) (9, 6) (13, 8) (15, 8) (11, 6)
   (7, 4) (3, 2) (2, 2) (6, 4) (10, 6) (14, 8)
   (12, 7) (8, 5) (4, 3)

   c (17, 11) (16, 14) (14, 16) (11, 17) (8, 17) (5, 16)
   (3, 14) (2, 11) (2, 8) (3, 5) (5, 3) (8, 2)
   (11, 2) (14, 3) (16, 5) (17, 8)

   d (2, 7) (14, 0) (0, 14) (10, 1) (3, 5) (7, 2)
   (1, 10) (5, 3)

The Coordinate Plane

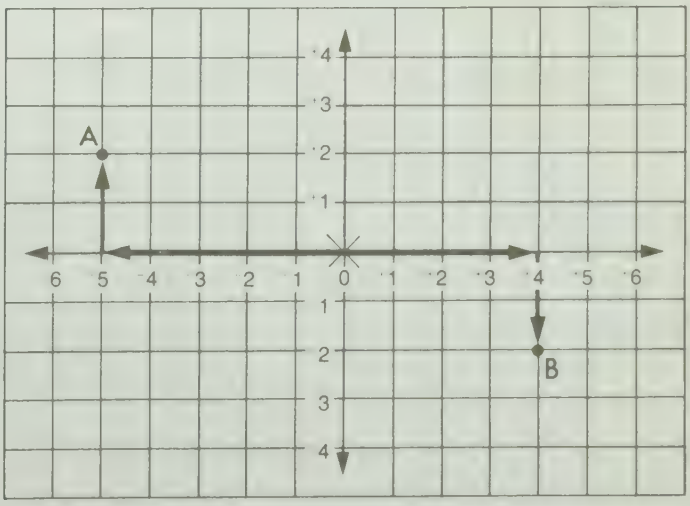
Ordered pairs of integers are graphed on a grid called a coordinate plane. The figure below shows a coordinate plane on graph paper.



Ordered pairs tell where points are located in the coordinate plane. The location of any point on a coordinate plane can be described this way. The first number in an ordered pair tells how far the point is to the left or right of the origin on the horizontal axis. The second number tells how far the point is above or below the origin on the vertical axis.

To reach point A: Starting at the origin, go 5 units to the left and then 2 units up. Point A is at $(^{-}5, {}^{+}2)$.

To reach point B: Starting at the origin, go 4 units to the right and then 2 units down. Point B is at $(^{+}4, {}^{-}2)$.



Practice

1. Draw horizontal and vertical axes on a piece of graph paper. Write how to locate each ordered pair (How many units to the left or right? How many up or down?). Then graph the ordered pairs.

H $(^{-}1, ^{+}4)$ _____ L $(0, ^{+}2)$ _____

I $(^{+}3, ^{-}2)$ _____ M $(^{-}4, 0)$ _____

J $(^{-}3, ^{-}2)$ _____ N $(^{+}4, ^{+}1)$ _____

K $(^{-}2, ^{+}1)$ _____

2. Graph all the following ordered pairs. Then connect the points with line segments, in the order given.

$(^{+}5, ^{+}3)$ $(^{+}4, ^{+}4)$ $(^{+}3, ^{+}4)$ $(^{+}2, ^{+}2)$ $(^{-}2, ^{+}2)$ $(^{-}3, ^{+}3)$

$(^{-}3, ^{+}2)$ $(^{-}2, ^{+}1)$ $(^{-}2, ^{-}2)$ $(^{-}3, ^{-}3)$ $(^{-}2, ^{-}3)$ $(^{-}1, ^{-}2)$

$(^{-}1, ^{-}1)$ $(0, ^{-}1)$ $(0, ^{-}2)$ $(^{+}1, ^{-}3)$ $(^{+}1, ^{-}1)$ $(^{+}2, ^{-}1)$

$(^{+}2, ^{-}2)$ $(^{+}3, ^{-}3)$ $(^{+}3, ^{-}1)$ $(^{+}4, ^{-}1)$ $(^{+}4, ^{-}2)$ $(^{+}5, ^{-}3)$

$(^{+}5, 0)$ $(^{+}4, 0)$ $(^{+}4, ^{+}2)$

Generating Ordered Pairs Involving Integers

Integers can be used to generate ordered pairs as we did with whole numbers.
Complete this chart.

n	n + $^{+}1$	Ordered Pairs
$^{-}3$	$-3 + {}^{+}1 = {}^{-}2$	$({}^{-}3, {}^{-}2)$
$^{-}2$	$^{-}2 + {}^{+}1 = {}^{-}1$	$({}^{-}2, {}^{-}1)$
$^{-}1$	_____	_____
0	_____	_____
$^{+}1$	_____	_____
$^{+}2$	$^{+}2 + {}^{+}1 = {}^{+}3$	$({}^{+}2, {}^{+}3)$
$^{+}3$	_____	_____

Practice

Complete these tables.

1.

n	2n	Ordered Pair
$^{-}3$	$2({}^{-}3) = {}^{-}6$	$({}^{-}3, {}^{-}6)$
$^{-}2$	_____	_____
$^{-}1$	_____	_____
0	_____	_____
$^{+}1$	_____	_____
$^{+}2$	_____	_____
$^{+}3$	_____	_____
$^{+}4$	_____	_____

2.

n	$^{-}2n$	Ordered Pair
$^{-}3$	$^{-}2({}^{-}3) = {}^{+}6$	$({}^{-}3, {}^{+}6)$
$^{-}2$	_____	_____
$^{-}1$	_____	_____
0	_____	_____
$^{+}1$	_____	_____
$^{+}2$	_____	_____
$^{+}3$	_____	_____
$^{+}4$	_____	_____

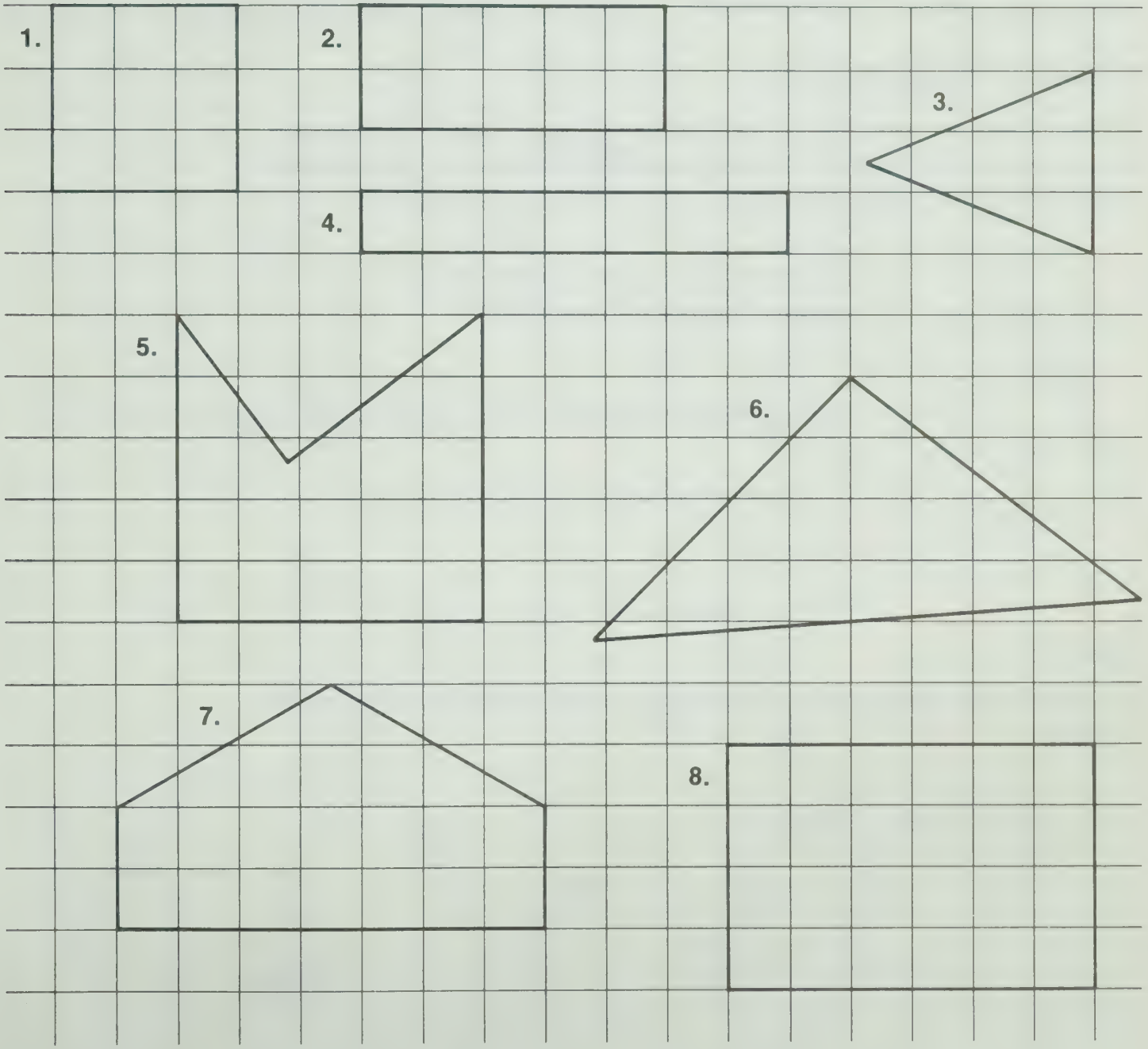
3.

n	n + $^{-}2$	Ordered Pair
$^{-}4$	$^{-}4 + {}^{-}2 = {}^{-}6$	$({}^{-}4, {}^{-}6)$
$^{-}3$	_____	_____
$^{-}2$	_____	_____
$^{-}1$	_____	_____
0	_____	_____
$^{+}1$	_____	_____
$^{+}2$	_____	_____
$^{+}3$	_____	_____
$^{+}4$	_____	_____

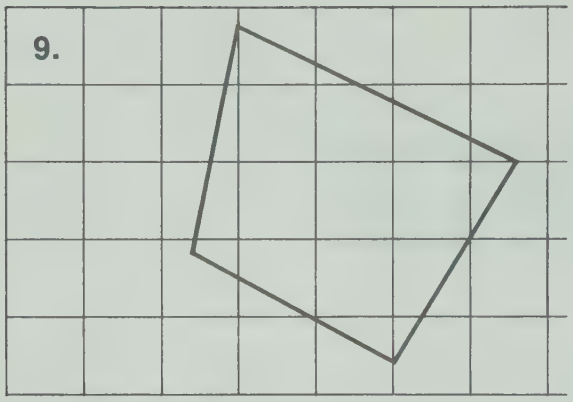
PERIMETER, AREA, AND VOLUME

Perimeter

An ant had to walk on the black lines below that form squares, rectangles, and triangles. Measure how far he would have to walk if he went all the way around each shape. Write your answer inside each figure. The distance around each of these figures is called the **perimeter.**



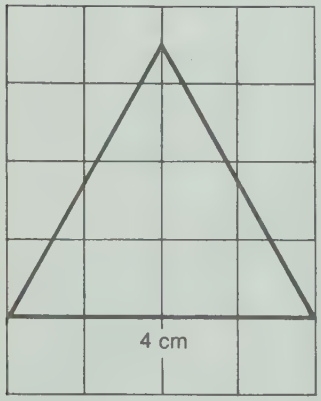
9.



10.

Perimeter of Regular Polygons

Sometimes it is not necessary to measure the distance around a figure to get its perimeter. If all sides of the plane figure are the same length, then you need to measure only one side. Such figures are called **regular polygons.**



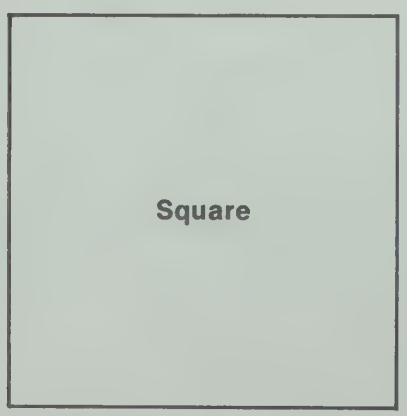
The sides of this triangle have the same measure. Therefore, the perimeter is:

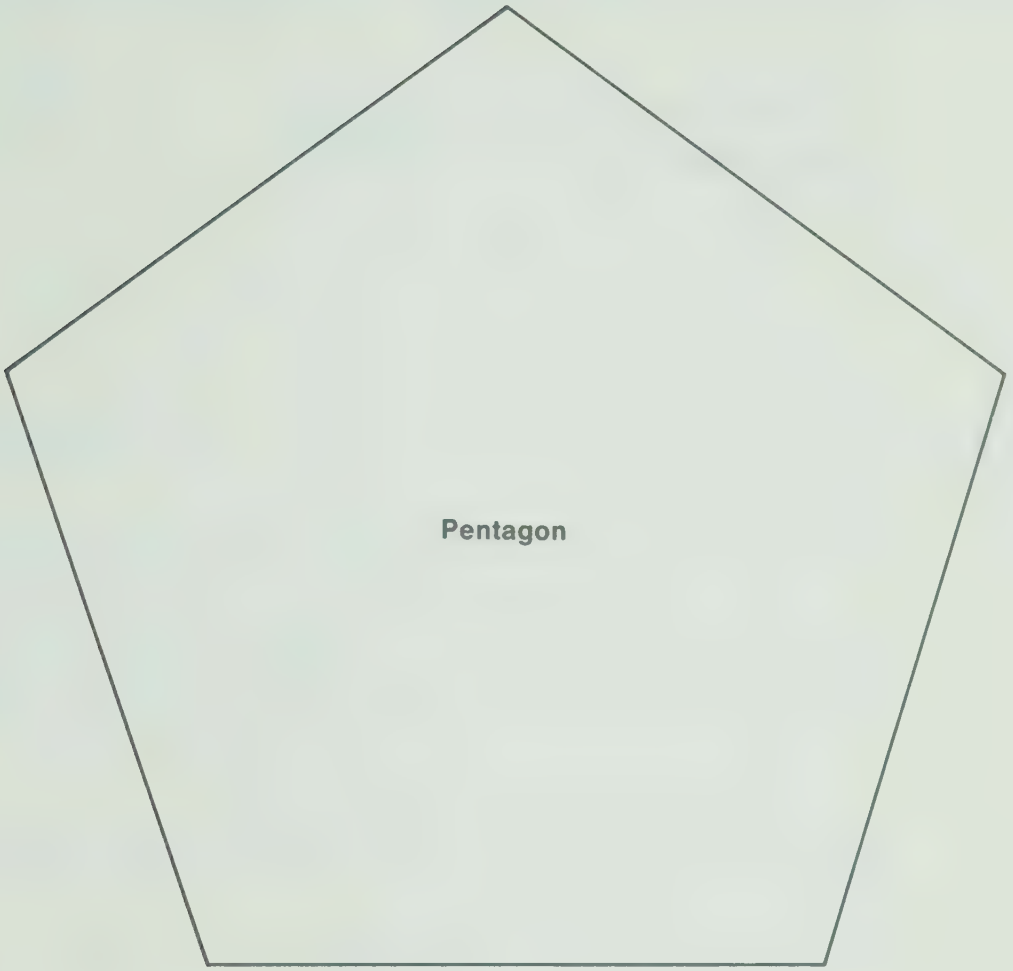
$3 \times 4 = 12$ cm.

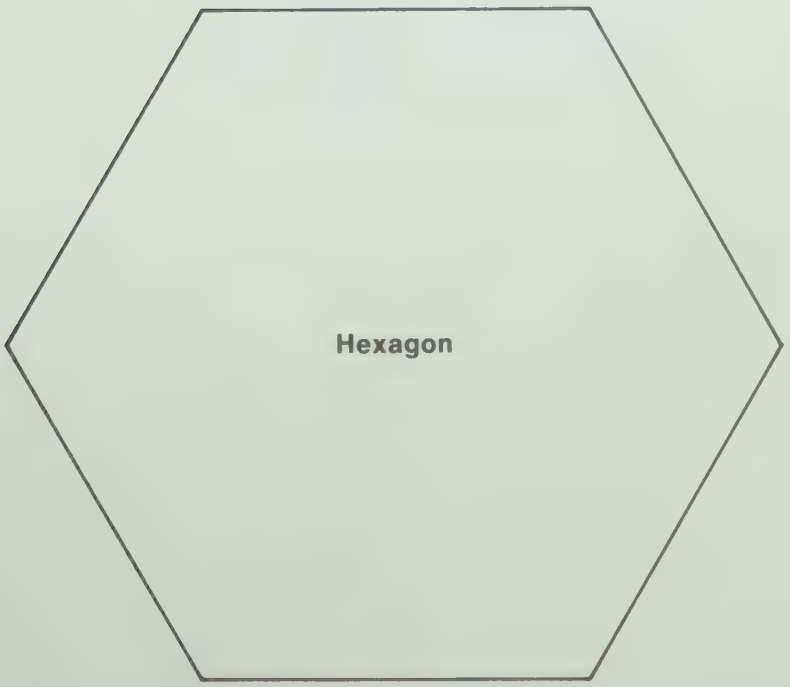
What would be the perimeter of the triangle if each side were 14 cm? _____

Practice

1. Find the perimeter of each regular polygon. Write your answer inside each figure.




Pentagon


Hexagon

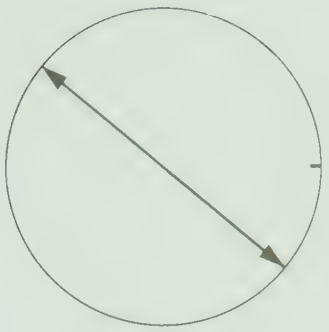
2. Find the perimeter of each of these regular polygons.

	Number of equal sides	Measure of each side	Perimeter
a triangle	3	15 cm	_____
b square	4	6 km	_____
c octagon	8	10 cm	_____
d dodecagon	12	15 mm	_____
e pentagon	5	8 m	_____
f nonagon	9	7 cm	_____
g heptagon	7	12 m	_____
h icosagon	20	3 mm	_____
i hexagon	6	9 cm	_____
j decagon	10	13 m	_____

Radius, Diameter, and Circumference of a Circle

Circumference

Radius



Diameter

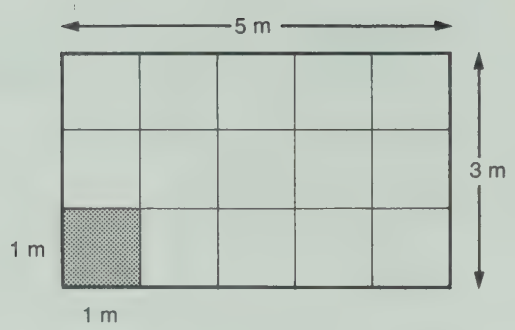
The perimeter (distance around) of a circle is called its **circumference.** This is the distance the circle would travel if it rolled exactly one turn.

A circle has a **centre.** The distance from the centre to the edge of the circle is called a **radius.** The distance from one edge of the circle, through the centre, to the other edge is called the **diameter.**

Cut out five circles of different sizes from heavy paper. Roll each circle once around. Then measure the radius, diameter, and circumference of each circle.

Circle	Radius	Diameter	Circumference
A	_____	_____	_____
B	_____	_____	_____
C	_____	_____	_____
D	_____	_____	_____
E	_____	_____	_____

Area of Rectangles

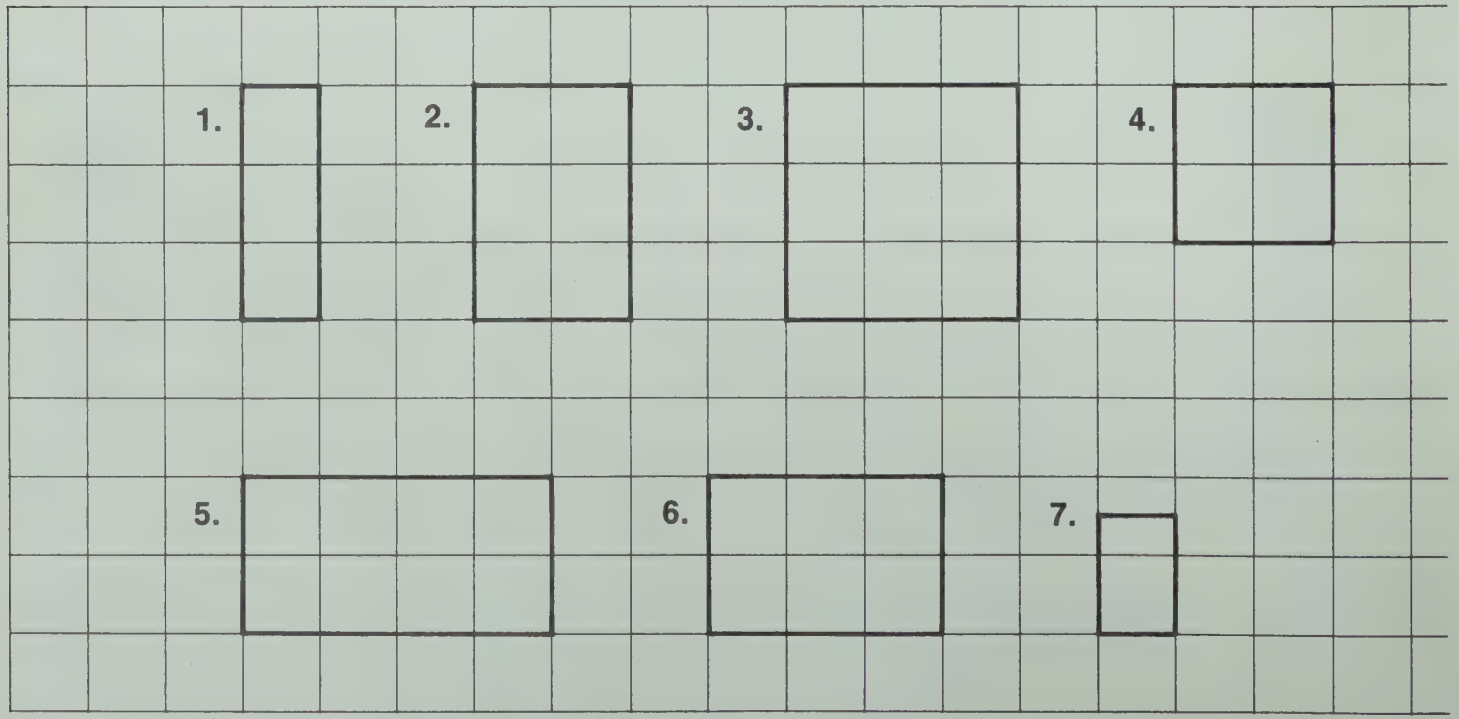


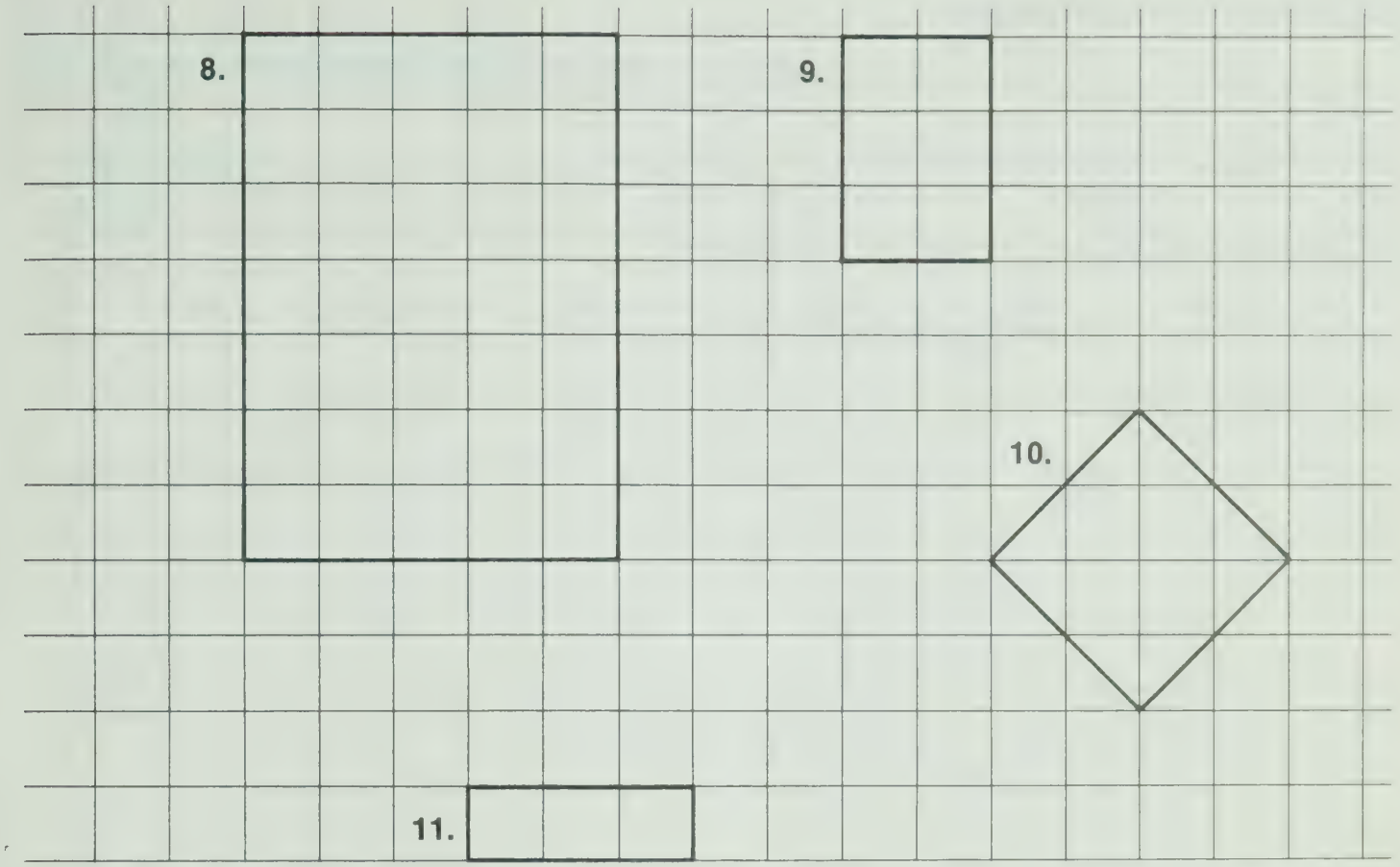
Your father wants to build a rectangular patio 5 m long and 3 m wide. He decides to use square concrete tiles of 1 m length on each side. He needs your help to estimate the cost of the job.

Before you can estimate the cost, you must know how many tiles are needed to cover the 3 m by 5 m surface. The amount of surface to be covered is called the **area.**

Area is always measured in **square units** of measure. Some common square units of measure are: square centimetre (cm^2), square decimetre (dm^2), square metre (m^2), and square kilometre (km^2).

Find the area of each plane figure below. Count the number of square centimetres that each figure encloses.





Remember, area is always measured in square units of measure. One way to find the area of a figure is to count the number of squares it covers. There are easier ways to find the area other than by counting squares. Try to find one of these easier ways.

Clue:

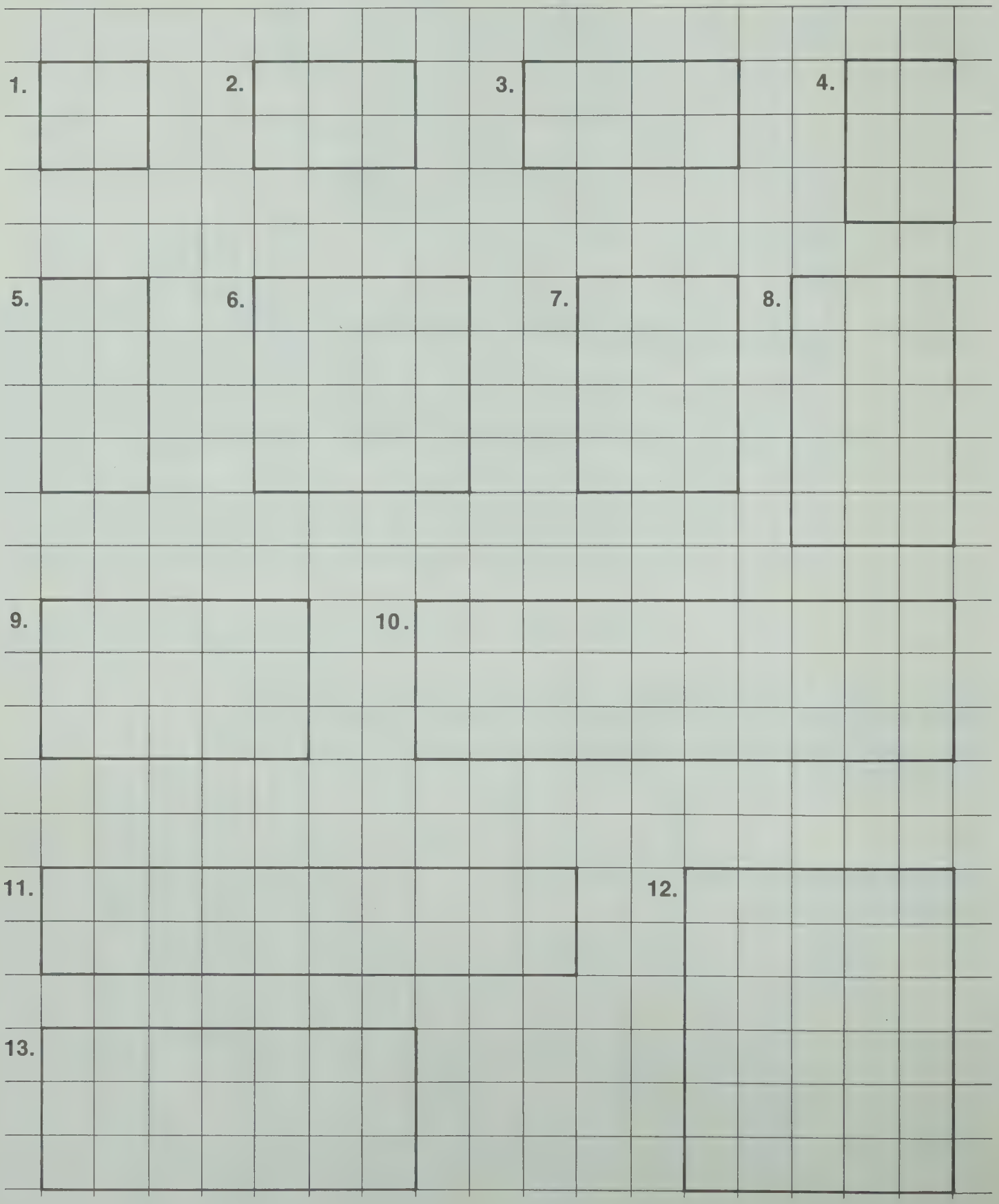
How many square centimetres in one row? _____

How many rows? _____

Area = ____ x ____

= ____ cm^2

Find the area of these rectangles:

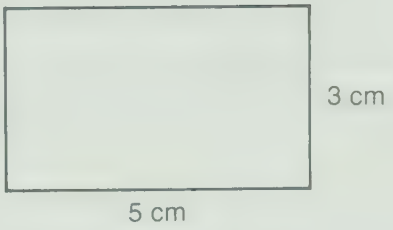


Practice

Find the area of each rectangle using its length and width.

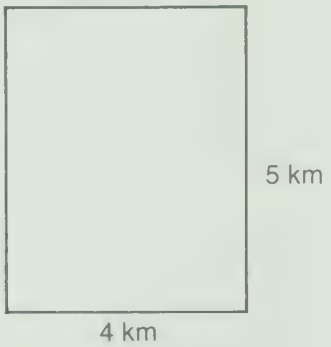
1. The square unit is_____.

The area is_____.



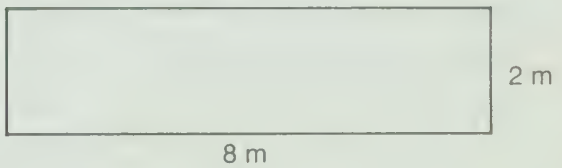
2. The square unit is_____.

The area is_____.



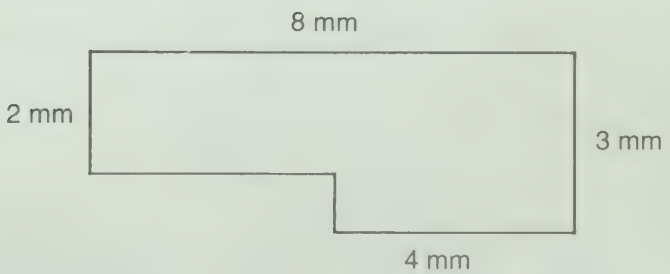
3. The square unit is_____.

The area is_____.



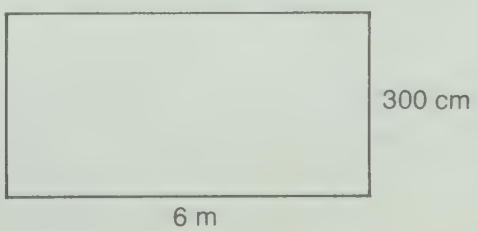
4. The square unit is_____.

The area is_____.



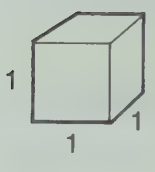
5. The square unit is_____.

The area is_____.



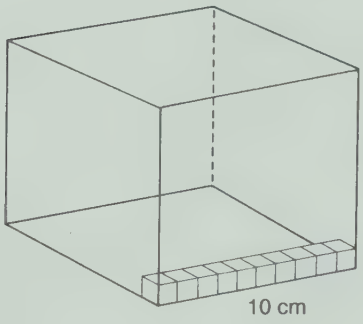
Volume of Rectangular Solids

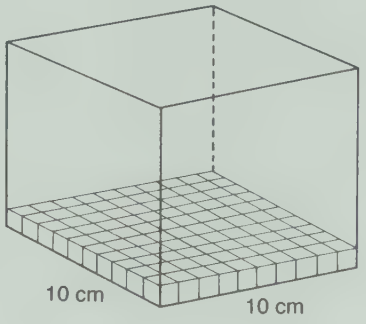
The amount of space an object takes up is called **volume**. The unit measure of volume is a cube with edges 1 unit long. The volume of a space figure is the number of unit cubes which will fill the figure.

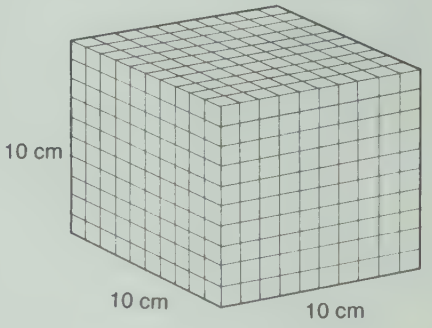


Three common units used to measure volume are: the cubic centimetre (cm^3), the cubic decimetre (dm^3), and the cubic metre (m^3).

1. A block measures 10 cm high, 10 cm wide, and 10 cm long. What is the volume of the block? The unit of volume would be the cubic centimetre (cm^3).







a How many cubic centimetres does the row have? ____

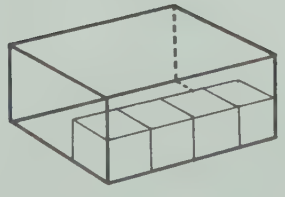
b How many rows does the layer have? ____
How many cubic centimetres in the layer? ____

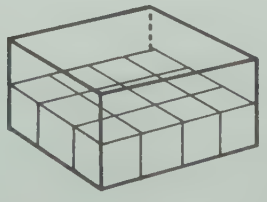
c How many layers does the block have? ____
How many cubic centimetres does the block have? ____

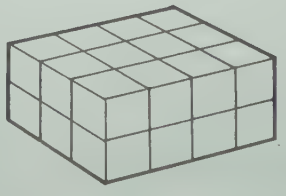
The volume of this block is 10 x 10 x 10 cm^3 or 1000 cm^3.

Practice

1.







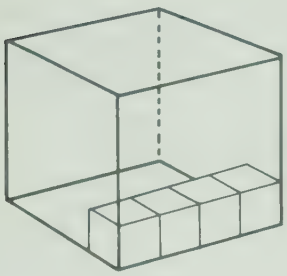
a How many cubes in each row? ____

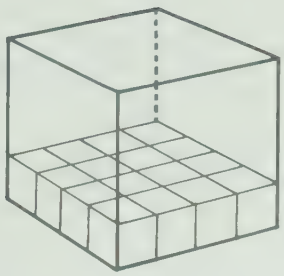
b How many rows in each layer? ____
How many cubes in each layer? ____

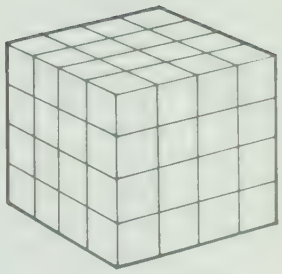
c How many layers? ____
How many cubes in all the layers? ____

The volume of this block is _____

2. Each cube has a volume of 1 cm^3.





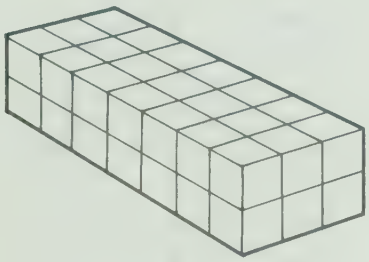


a What is the length? _____ **b** What is the width? _____ **c** What is the height? _____

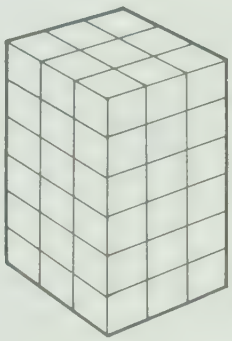
d What is the volume? _____

3. What is the volume of each block below? The cubic unit is cm^3

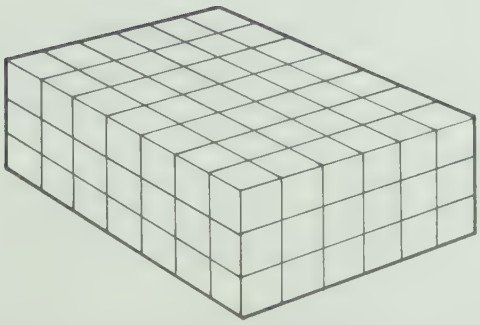
a



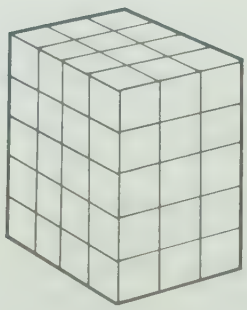
b



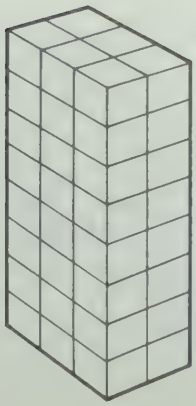
c



d

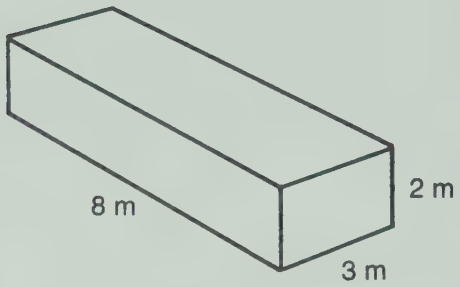


e

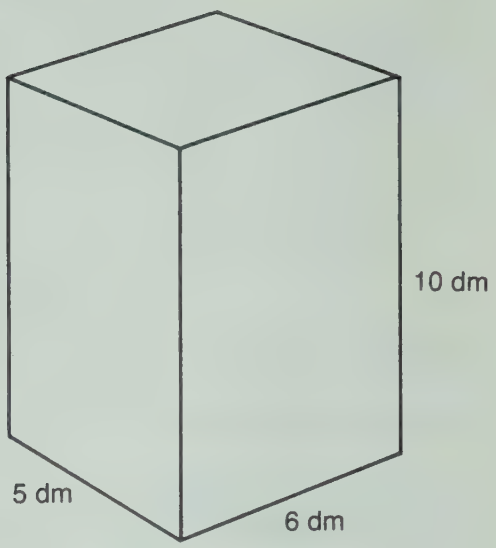


4. What is the volume of each box below?

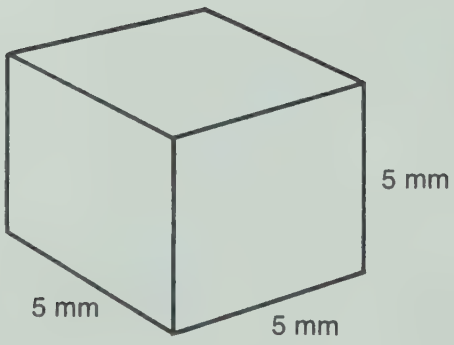
a



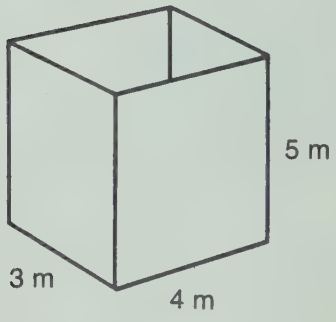
b



c



d



5. What is the volume of a box that measures:

a 10 cm long, 4 cm high, and 4 cm wide? _____

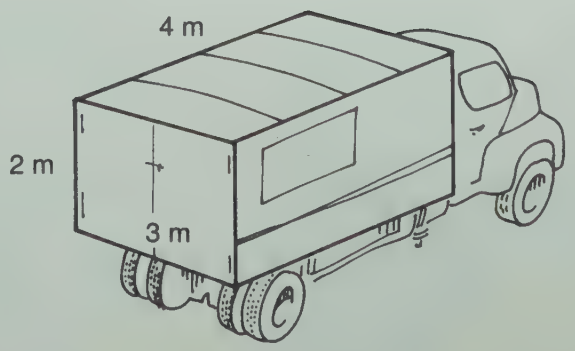
b 1 m by 1 m by 1 m? _____

c 10 m by 5 m by 2 m? _____

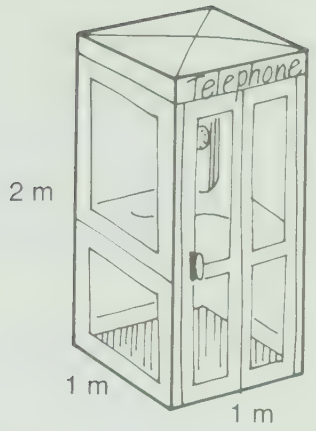
d 80 cm by 2 m by 50 cm? _____

e 12 cm wide, 5 cm long, and 1 cm high? _____

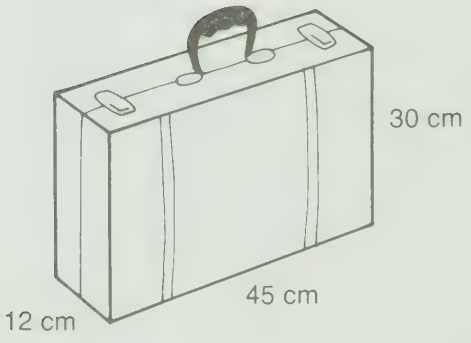
6. Find the volume of the truck box.



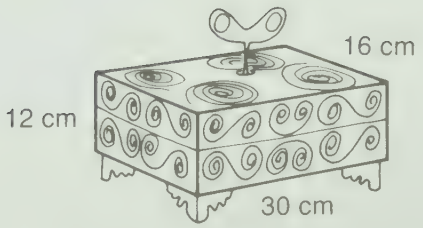
7. Find the volume of the telephone booth.



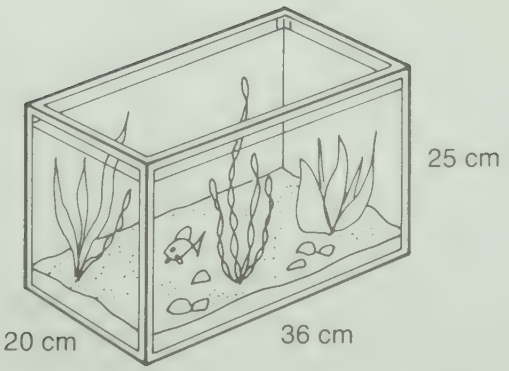
8. Find the volume of the briefcase.



9. Find the volume of the music box.



10. Find the volume of the aquarium.



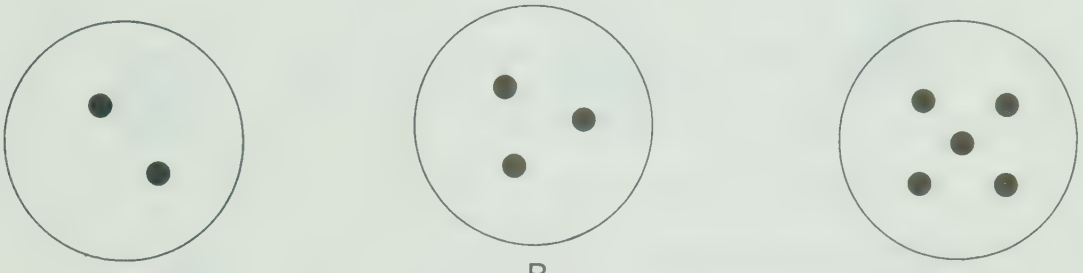
RATIO AND PROPORTION

Ratio

A survey shows that three times as many people buy *Chatelaine* magazine as buy *Maclean's.* This means that for every three people who buy *Chatelaine,* there is one person who buys *Maclean's.* Or, the number of *Chatelaine* buyers to the number of *Maclean's* buyers is three to one. The expression "three to one" is a **ratio.**

Ratio is a comparison of one number or quantity to another. The units or quantities being compared are of the same type. Ratios are written with a colon(:) between the quantities being compared. For example, the ratio "three to one" is written 3:1. The numbers 3 and 1 in the ratio are called **terms.**

Look at the circles below.



How many dots in A? ____ in B? ____ in C? ____
The ratio of the number of dots in B to the number of dots in A is 3:2.

1. The ratio of the number of dots in C to the number of dots in B is ____.

2. The ratio of the number of dots in C to the number of dots in A is ____.

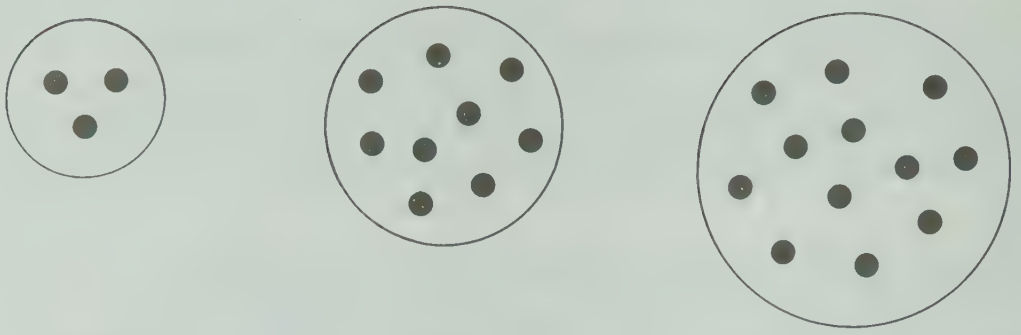
Here are two more circles.

3. The ratio of the number of dots in D to the number of dots in E is ____.

4. The ratio of the number of dots in E to the number of dots in D is ____.

Practice

1.



X Y Z

Find the ratio of:

a the number of dots in X to the number of dots in Y. ____

b the number of dots in Y to the number of dots in X. ____

c the number of dots in X to the number of dots in Z. ____

d the number of dots in Z to the number of dots in X. ____

e the number of dots in Y to the number of dots in Z. ____

f the number of dots in Z to the number of dots in Y. ____

2. In your class, what is the ratio of

a the number of boys to the number of girls? ____

b the number of girls to the number of boys?____

c the number of boys to the number of students in the entire class? ____

d the number of girls to the number of students in the entire class? ____

3. The O'Leary Tornadoes had a bad season last year. They won 6 games and lost 10. Find:

a the ratio of the the number of games won to the number of games lost. ____

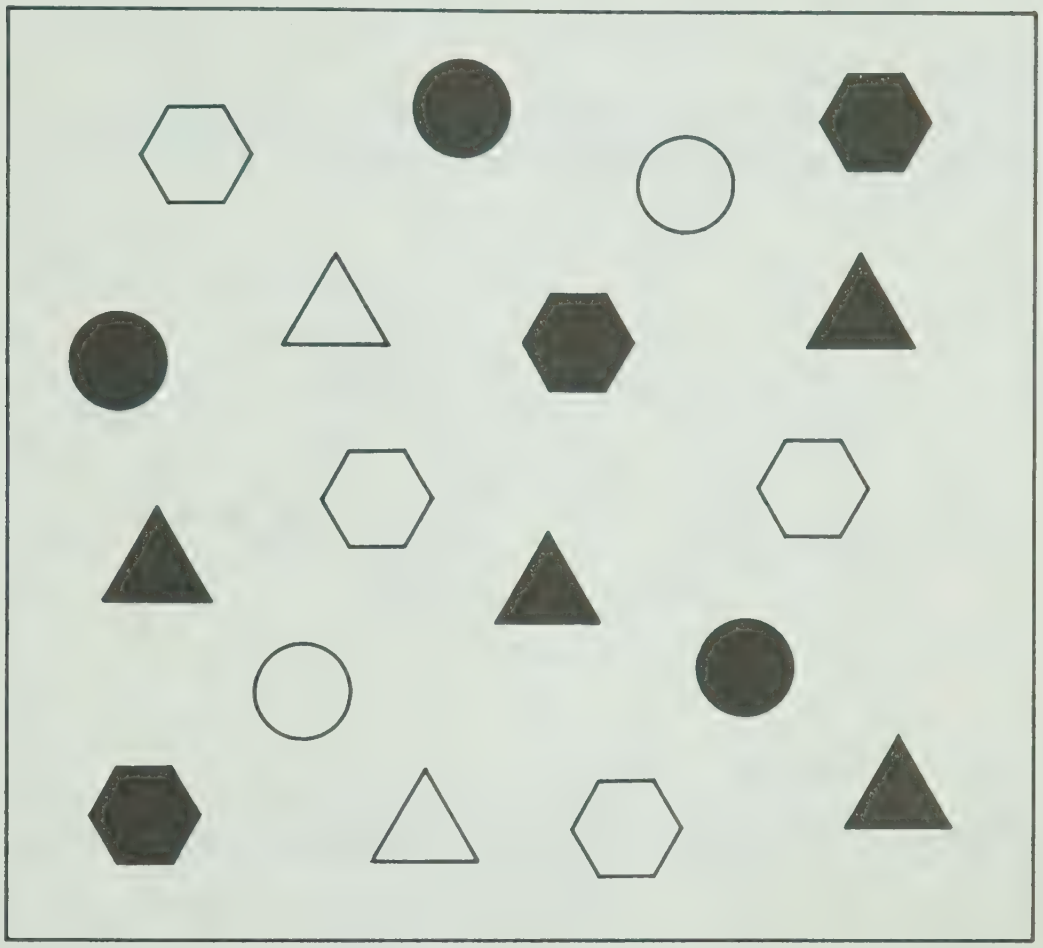
b the ratio of the number of games won to the total number of games played. ____

4. For every 8 questions on a test, a student answered 7 correctly. What is the ratio of:

a the number of questions on the test to the number he answered correctly? ____

b. the correct answers to the wrong answers? ____

5.



Study the figures in the box above. Write the ratio of:

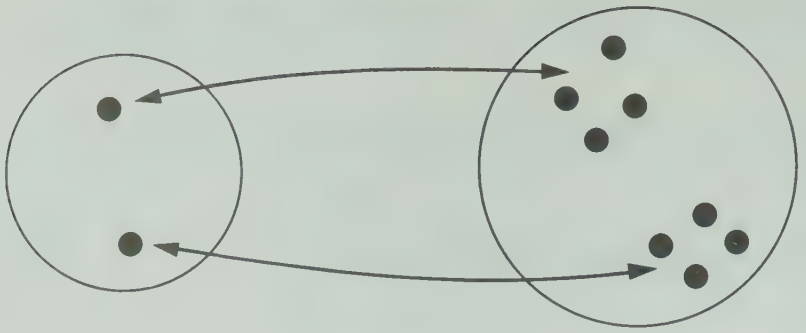
a the number of triangles to the number of hexagons. ____

b the number of circles to the number of hexagons. ____

c the number of hexagons to the number of circles. ____

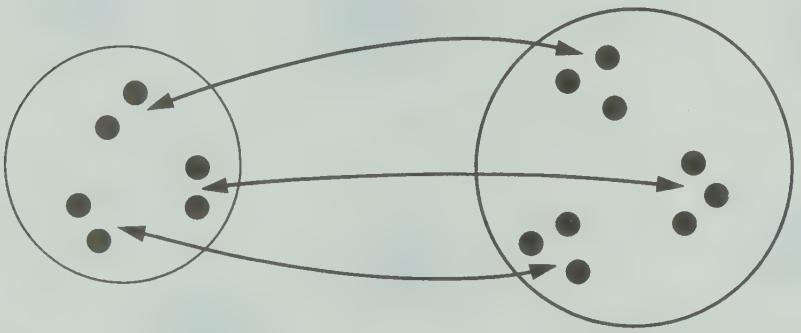
d the number of shaded circles to the number of unshaded circles. ____

e the number of shaded triangles to the number of unshaded triangles. ____



Consider circles A and B above.
The ratio of the number of dots in A to the number of dots in B is 2:8. It is also 1:4, since for each dot in A there are 4 dots in B. The ratios 2:8 and 1:4 are **equal ratios.**

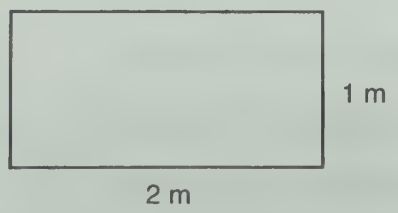
1.



For every 2 dots in C, there are ____ dots in D.

The ratio of the number of dots in C to the number of dots in D is 6:9 or 2: ____.

2.



Look at the rectangle above. The ratio of the width (in metres) to the length (in metres) is 1:2.

a Express the width and length in decimetres. The width is ____ dm. The length is ____ dm. The ratio of the width to the length is _____.

b Express the width and length in centimetres.

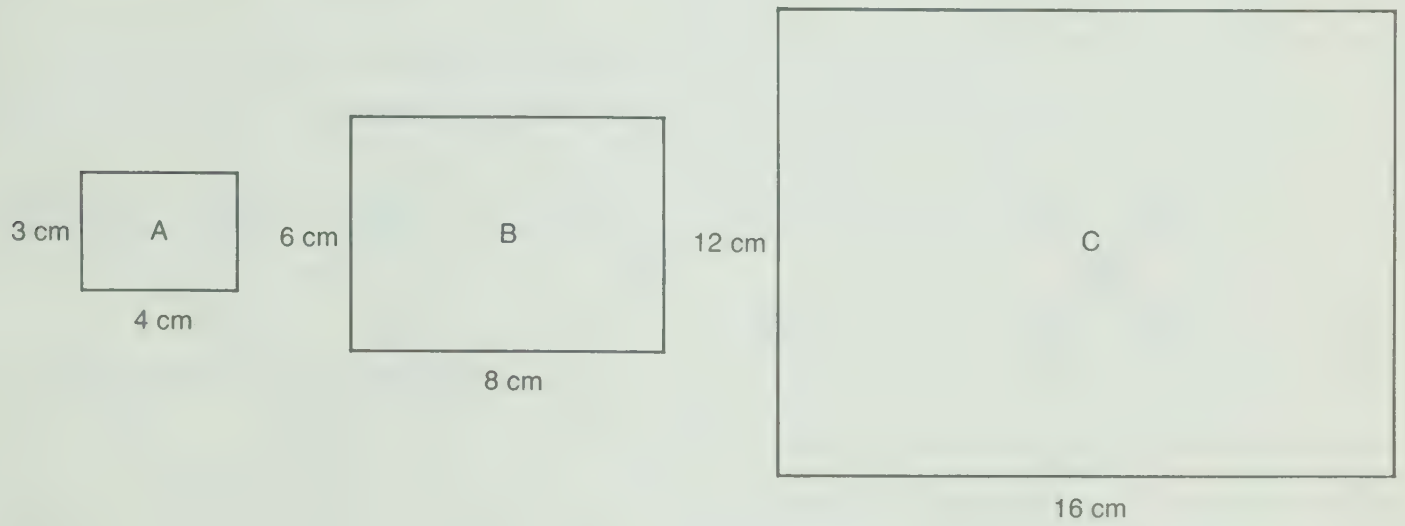
The width is ____ cm. The length is ____ cm. The ratio of the width to the length is _____.

c In the example above, the ratio of width to length may be expressed as 1:2, or _____, or _____.

These three ratios are _____.

Practice

1. Here are three rectangles:



a For rectangle A, the ratio of the length to the width is 4 : ____.

b For rectangle B, the ratio of the length to the width is ____ : 6.

c For rectangle C, the ratio of the length to the width is ____ : ____.

d How do the ratios in (a), (b), and (c) compare? ____

2. Below are 4 sets of ratios. In each set, find the ratio which does not belong. Circle it.

a	6:15	2:5	5:12	4:10
b	1:2	3:6	5:10	3:4
c	2:3	3:7	4:6	10:15
d	5:2	3:1	6:2	12:4

3. Find an equal ratio for each of the following:

a 3:8 _____ **b** 2:1 _____ **c** 6:2 _____ **d** 6:9 _____

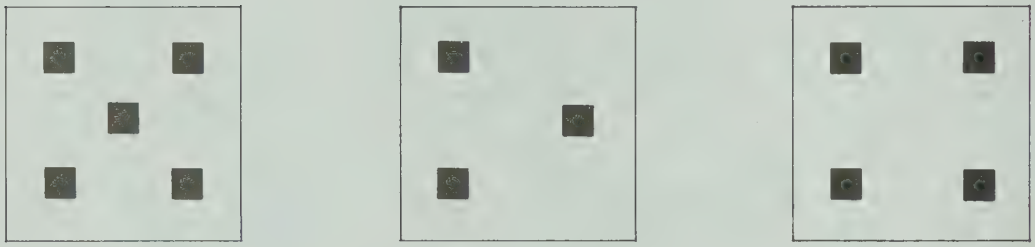
4. Jar A contains 2 marbles, jar B contains 4 marbles and jar C contains 6 marbles. Find the ratio of:

a the number of marbles in jar A to the number of marbles in jar B. _____

b the number of marbles in jar B to the number of marbles in jar A. _____

c the number of marbles in jar A to the number of marbles in jar C. _____

5.



C D E

Write the ratio of:

a the number of squares in C to the number of squares in D. _____

b the number of squares in D to the number of squares in E. _____

c the number of squares in E to the number of squares in C. _____

6. The ratio of boys to girls in Sam's class in 4:3.

a Can you tell exactly how many girls or boys there are? ____

b Are there more girls or more boys? ____

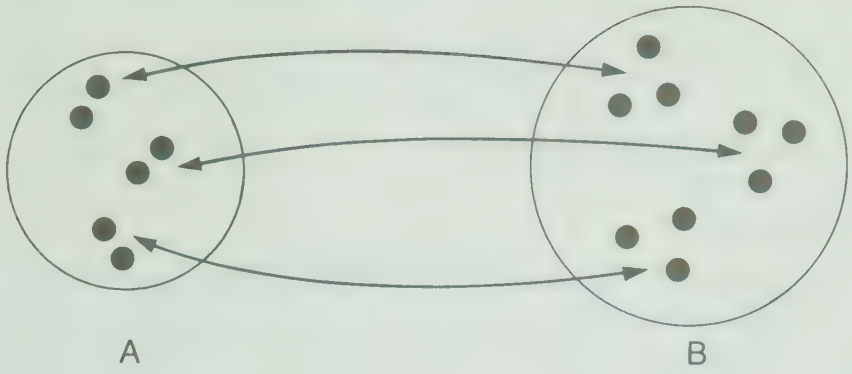
c For every ____ boys, there are ____ girls.

d Suppose there are 12 boys. How many girls are there? ____

e Suppose there are 27 girls. How many boys are there? ____

f Suppose there are 35 students in the class. How many boys are there? ____ How many girls? ____

Writing Ratios as Fractions



The ratio of the number of dots in A to the number of dots in B is 2:3, or 6:9. Ratios may also be expressed as fractions. 2:3 may by written $\frac{2}{3}$. 6:9 may be written $\frac{6}{9}$.

Writing ratios in fraction form makes it easier to compare them. For example, are the ratios $\frac{2}{3}$ and $\frac{6}{9}$ equal? _____

1. Write fractions for the following ratios:

a 10:5 ____ **b** 17:12 ____ **c** 99:8 ____ **d** 6:1 ____

2. Abe can walk to school in 30 min. The trip takes 16 min by bus. The ratio of walking time to bus time may be expressed as ____:____ or ____.

3. John used 3 L of ginger ale and 1 L of orange juice to make punch. The ratio of ginger ale to orange juice is 3:1 or ____.

Express the following ratios in fraction form.

a ginger ale to total punch ____

b orange juice to ginger ale ____

c orange juice to total punch ____

Practice

1. Write each ratio as a fraction.

a 4:6 ____ **b** 5:3 ____ **c** 3:4 ____

d 9:10 ____ **e** 16:14 ____ **f** 21:24 ____

2. Write each fraction as a ratio.

a $\frac{5}{8}$ _____ **b** $\frac{12}{18}$ _____ **c** $\frac{4}{5}$ _____

d $\frac{15}{3}$ _____ **e** $\frac{5}{9}$ _____ **f** $\frac{21}{9}$ _____

3. Write the ratio in fraction form of the following:

a the number of touchdowns for team A to the number of touchdowns for team C. ____

b the number of touchdowns for team B to the number of touchdowns for team D. ____

c the number of touchdowns for team D to the number of touchdowns for team A. ____

Team	Touchdowns
A	3
B	3
C	5
D	1

4. Write a fraction to express each ratio.

a There are 263 children in 10 classes. _____

b There were 27 children in 9 cars. ____

c There were 2 teams and 22 players. ____

d There were 4 teams and 20 players. ____

e There was 1 coach and 9 players. ____

5. Write a fraction to show the ratio of the cost to the number of items.

	Item	Number	Cost
a _____	**a** Candy bars	3	20¢
b _____	**b** Apples	8	35¢
c _____	**c** Lettuce	2	39¢
d _____	**d** Pencils	3	25¢
e _____	**e** Tablets	2	$1
f _____	**f** Shirts	1	$3

Proportions

Two ratios which are equal form a **proportion**.

$$\boxed{15:6 = 5:2} \qquad \boxed{\frac{15}{6} = \frac{5}{2}}$$

$$\boxed{2:3 = 8:12} \qquad \boxed{\frac{2}{3} = \frac{8}{12}}$$

Consider the two ratios 15:6 and 5:2. Do they form a proportion? Choose one of the two ratios and test for equality. Can you multiply or divide each term of the test ratio by the same number and obtain the other ratio? If you can, then the two ratios are equal.

$\boxed{\frac{15}{6} = \frac{5}{2}}$ is a proportion because $\frac{15 \div 3}{6 \div 3} = \frac{5}{2}$.

$\boxed{\frac{2}{3} = \frac{8}{12}}$ is also a proportion because $\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$.

Do the ratios 2:4 and 6:12 form a proportion?

Since $\frac{2 \times 3}{4 \times 3} = \frac{6}{12}$, the ratios 2:4 and 6:12 form a proportion.

Do the ratios 3:5 and 6:8 form a proportion?

Since $\frac{3 \times 2}{5 \times 2} = \frac{6}{10}$, $3:5 \neq 6:8$. The two ratios do **not** form a proportion.

Is 7:15 = 42:75 a proportion?

Because $\frac{7 \times 6}{15 \times 6} = \frac{42}{90}$, 7:15 and 42:75 do **not** form a proportion.

At St. Edmund's School, the students took a poll on the question: Should the school day start and end 15 minutes earlier? In one class the ratio of **yes** to **no** votes was reported as 20:8. In another class it was 5:2. Are these ratios equal? _____

Practice

1. Rewrite each proportion using fractions.

a $3:2 = 6:4$ _____ **b** $4:5 = 12:15$ _____ **c** $1:2 = 4:8$ _____

d $8:6 = 4:3$ _____ **e** $5:2 = 15:6$ _____ **f** $9:1 = 27:3$ _____

2. Rewrite each fraction in these proportions as a ratio.

a $\frac{3}{8} = \frac{9}{24}$ _____ **b** $\frac{3}{4} = \frac{6}{8}$ _____ **c** $\frac{5}{4} = \frac{15}{12}$ _____

d $\frac{12}{15} = \frac{24}{30}$ _____ **e** $\frac{6}{9} = \frac{12}{18}$ _____ **f** $\frac{8}{6} = \frac{4}{3}$ _____

3. Write true or false for each proportion.

a $4:6 = 3:2$ _____ **b** $2:1 = 50:100$ _____ **c** $5:7 = 10:14$ _____

d $7:3 = 21:9$ _____ **e** $7:9 = 11:13$ _____ **f** $3:5 = 6:10$ _____

g $\frac{5}{8} = \frac{10}{15}$ _____ **h** $\frac{4}{6} = \frac{32}{48}$ _____

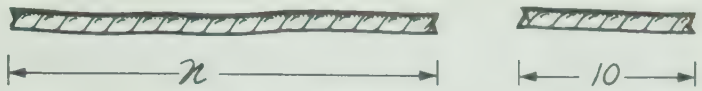
4. Bud's hockey team has won 12 games and lost 9. Bud said that the ratio of wins to losses was 4:3. Was he right? _____

5. Jack made 6 of 14 shots. Was his ratio of hits to misses 3 to 7? _____

Using Proportions

You can use proportions to solve some types of problems.

1. A sailor cuts a rope into two pieces. The ratio of the lengths is 5 to 2. The shorter piece is 10 m long. How long is the longer piece?



let n = length of the longer piece
now, long : short = 5 : 2
so, $n : 10 = 5 : 2$

$$\frac{5}{2} = \frac{n}{10}$$

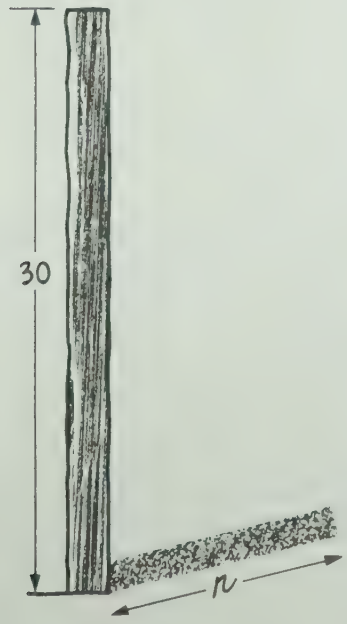
$$\frac{5 \times ?}{2 \times ?} = \frac{n}{10}$$

$$\frac{5 \times 5}{2 \times 5} = \frac{n}{10}$$

$$n = 5 \times 5$$
$$= 25$$

The longer piece is 25 m.

2. At a certain time during the day, the shadow of a pole is 2 m long for every 5 m of pole height. If the pole is 30 m high, how long is the shadow?



let n = length of the shadow

$$\frac{\text{shadow}}{\text{pole}} = \frac{2}{5}$$

$$\frac{n}{30} = \frac{2}{5}$$

$$\frac{n}{30} = \frac{2 \times ?}{5 \times ?}$$

$$\frac{n}{30} = \frac{2 \times 6}{5 \times 6}$$

$$n = 2 \times 6$$
$$= 12$$

The shadow is 12 m long.

Practice

1. Solve each proportion.

a $\frac{n}{8} = \frac{12}{32}$ **b** $\frac{4}{n} = \frac{12}{15}$ **c** $\frac{n}{12} = \frac{9}{36}$ **d** $\frac{2}{12} = \frac{n}{6}$

e $\frac{24}{15} = \frac{n}{5}$ **f** $\frac{4}{16} = \frac{3}{n}$ **g** $\frac{15}{13} = \frac{45}{n}$ **h** $\frac{n}{9} = \frac{4}{36}$

2. If a dozen doughnuts cost $1.20, what do 3 doughnuts cost?

3. A 6 g package of candy costs 40¢. What would an 18 g package of the same kind of candy cost?

4. A superball bounces 3 m for every 4 m of drop height. The superball is dropped from a height of 28 m. How high does it bounce?

5. If 6 pencils cost 30¢, what do 18 pencils cost?

6. On a map, the scale shows that 3 cm represents a distance of 75 km. What distance is represented by 5 cm?

7. The building plan for a house shows that the ratio of the dimensions in the drawing to the actual house size is 3 cm to 100 cm. The length of a room in the house is 500 cm. What is its length in the drawing?

8. A stack of 40 papers is 1 cm high. How high is a stack of 280 papers?

9. Canned soft drinks sell at 8 cans for $1.00. At that price, what is the cost of 24 cans?

10. Bob gets 7 hits for every 15 times he is at bat. Last year, while playing baseball, he was at bat 45 times. How many hits did he get?

11. Two cookies cost 15¢. How much do 4 cookies cost?

12. A freight train is going 45 km/h. At this speed, how far will it travel in 5 h?

13. Mr. Rowe uses 2 kg of meat to make 14 hamburgers. How many kilograms would he need for 56 hamburgers?

14. A balloon is drifting 9 km/h. At this speed, how long will it take to drift 36 km?

15. Three cans of root beer cost 29¢. How much do 6 cans cost?

16. Patsy can buy 2 goldfish for 59¢. How much would she pay for 10 goldfish?

17. A cook scrambles 8 eggs for every 3 people. How many eggs would the cook scramble for 6 people?

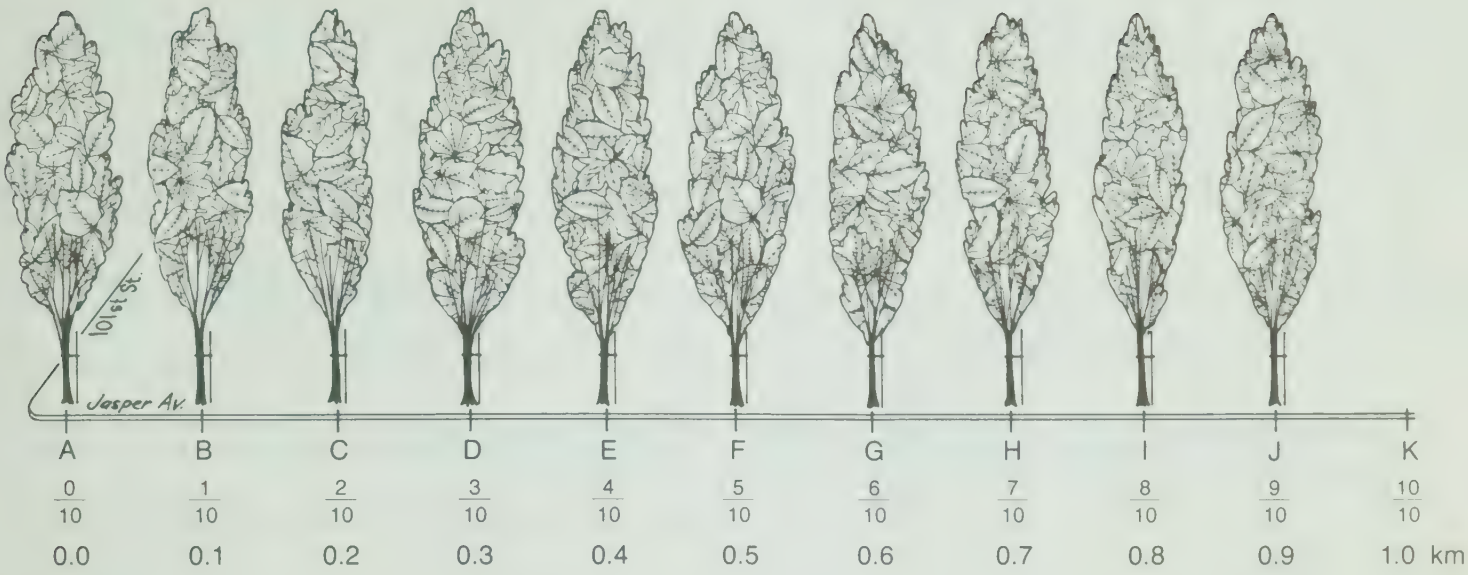
18. Five pens cost 98¢. How much do 10 pens cost?

19. If 2 kg of bananas cost 61¢, how much do 8 kg of bananas cost?

20. Last summer, Cathy helped her father in the ice cream store. In 7 days she sold 343 cones. How many did she sell per day?

DECIMALS

Decimals to Tenths: Reading and Writing



The Parks Department has planted trees along the north side of Jasper Avenue. All the trees have been spaced one tenth of a kilometre apart.

Tree A is at the corner of 101st Street and Jasper Avenue.

Tree H is $\frac{7}{10}$ km from 101st street.

You can write a decimal for $\frac{7}{10}$ like this: 0.7 decimal point

Both $\frac{7}{10}$ and 0.7 are read "seven tenths."

Use the diagram above. Write a decimal to tell how far each tree is from 101st Street. Read each decimal.

1. Tree G _____ **2.** Tree B _____ **3.** Tree I _____ **4.** Tree F _____

5. Tree E _____ **6.** Tree C _____ **7.** Tree J _____ **8.** Tree D _____

Practice

1. Whenever your father buys gasoline at the pumps, the gauge registers the amount of gas he takes.
The gauge reads:

3 6	2

He has bought "thirty six and two-tenths" litres of gasoline.

Read these decimals:

a 0.9 **b** 14.7 **c** 33.3 **d** 56.0
e 1.6 **f** 19.4 **g** 41.5 **h** 8.2
i 27.1 **j** 50.8

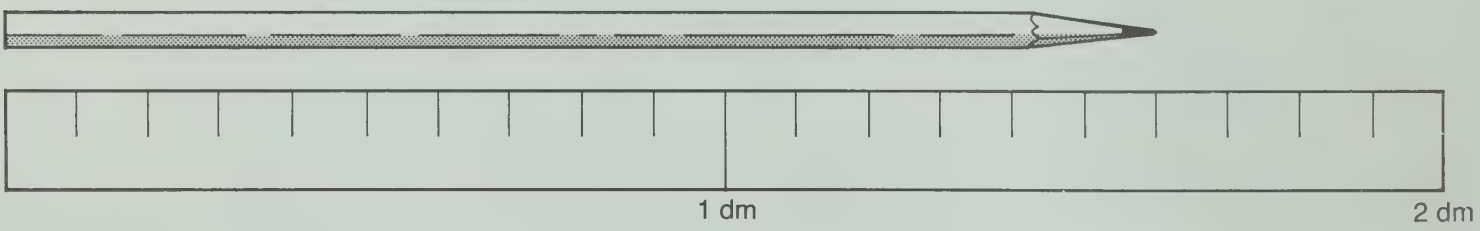
2. Many gasoline pumps register the amount of gasoline sold in fraction form.
The gauge would read like this:

3 2	$\frac{6}{10}$

You are the cashier at a service station. To register the gas purchases for credit card users, change these gauge readings to decimals:

a 56 $\frac{2}{10}$ L _____ **b** 66 $\frac{0}{10}$ L _____ **c** 30 $\frac{1}{10}$ L _____ **d** 27 $\frac{5}{10}$ L _____
e 39 $\frac{6}{10}$ L _____ **f** 59 $\frac{8}{10}$ L _____ **g** 81 $\frac{7}{10}$ L _____ **h** 43 $\frac{3}{10}$ L _____

Decimals to Tenths: Measurement



The drawing above shows a decimetre-centimetre rule. One centimetre is one tenth of a decimetre, or 0.1 dm. The pencil is 16 cm long. That's the same as 1 dm and 6 cm. That's the same as 1.6 dm.

Fill in the blanks.

16 cm = 1 dm and 6 cm = 1.6 dm

43 cm = ____ dm and ____ cm = ____ dm

____ cm = 2 dm and 7 cm = ____ dm

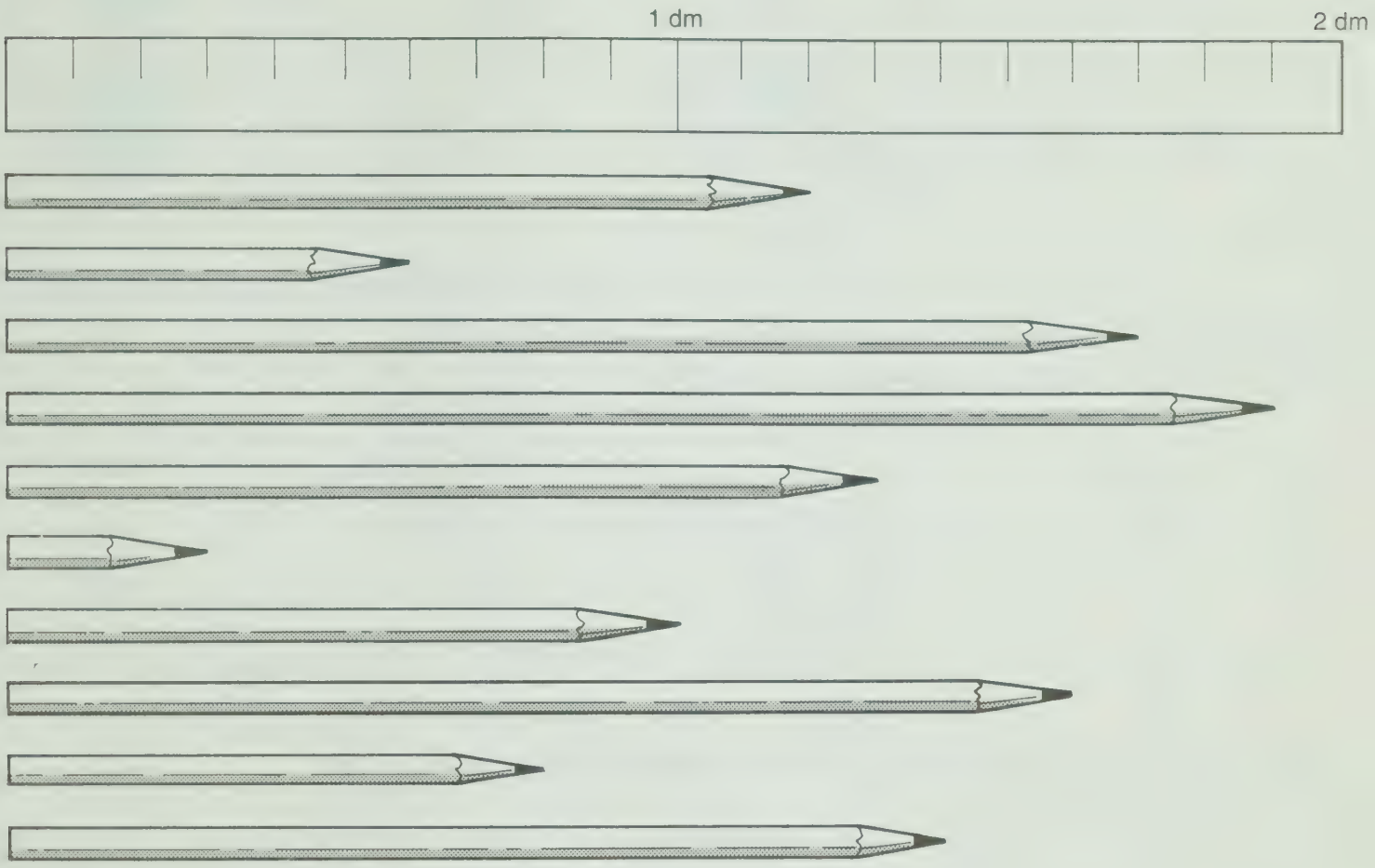
____ cm = ____ dm and ____ cm = 1.9 dm

7 cm = ____ dm and ____ cm = ____ dm

____ cm = 0 dm and 9 cm = ____ dm

Practice

1. Measure each pencil. Write your answer in decimetres and centimetres, and in decimetres.



2. Measure the following lengths in your classroom, using your decimetre-centimetre rule. Write your answer three ways: in centimetres, in decimetres and centimetres, and in decimetres using a decimal point.

   a Length of the cover of a book: _____cm, _____ dm and _____ cm, _____dm.

   b Width of your desk: _____cm, _____ dm and _____ cm, _____dm.

   c Height of the seat of your chair: _____ cm, _____dm and _____ cm, _____dm.

   d Length of your pencil: _____cm, _____ dm and _____ cm, _____dm.

   e Width of door in your room: _____ cm, _____dm and _____ cm, _____ dm.

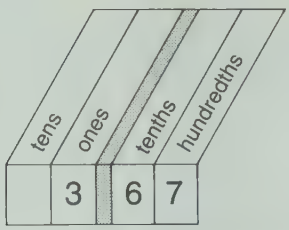
   f Width of your teacher's desk: _____cm, _____dm and _____cm, _____dm.

   g Length of your shoe: _____cm, _____dm and _____cm, _____dm.

   h Length of the bulletin board: _____cm, _____dm and _____cm, _____dm.

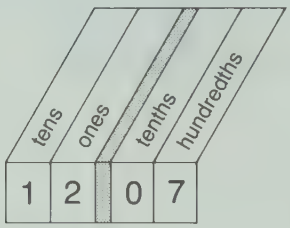
Decimals to Hundredths: Reading and Writing

In our number system, the value of a digit depends on its place in relation to other digits and its relation to a decimal point.



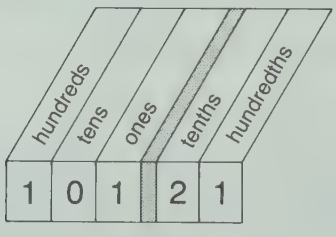
3.67

The number above can be written as the fraction $3\frac{67}{100}$, or as the decimal 3.67. It is read as "three and sixty-seven hundredths."



12.07

You can write the number as $12\frac{7}{100}$ or 12.07. You read the number as "twelve and seven hundredths."



101.21

Write the number above: _____ or _____.

The number is read as: _____.

Practice

1. Read these decimals:

a	0.2	**b**	66.66	**c**	11.1	**d**	51.02	**e**	142.35
f	184.17	**g**	70.5	**h**	9.35	**i**	300.4	**j**	0.08

2. Our money is based on the decimal system. There are 100 cents in one dollar.

1¢
1 hundredth of a dollar
$0.01

10¢
10 hundredths of a dollar
$0.10

5¢
5 hundredths of a dollar
$0.05

25¢
25 hundredths of a dollar
$0.25

Write each price with a dollar sign and a decimal point.

a 9¢ _____ **k** ninety-three cents _____

b 98¢ _____ **l** fifteen dollars and six cents _____

c 75¢ _____ **m** four dollars and nine cents _____

d 15¢ _____ **n** twenty-seven dollars and ninety cents _____

e 29¢ _____ **o** forty dollars and fifty-nine cents _____

f 47¢ _____ **p** eight hundred dollars and ten cents _____

g 50¢ _____ **q** one dollar and four cents _____

h 33¢ _____ **r** five hundred five dollars and five cents _____

i 89¢ _____ **s** two dollars and sixty-three cents _____

j 67¢ _____ **t** ninety dollars and nine cents _____

3. Express each number as a decimal.

a $6\ \frac{5}{100} =$ _____

b $63\ \frac{85}{100} =$ _____

c $\frac{3}{10} =$ _____

d $\frac{73}{100} =$ _____

e $104\ \frac{2}{100} =$ _____

f 25 and 8 hundredths = _____

g 61 and 4 tenths = _____

h 83 hundredths = _____

i 9 and 36 hundredths = _____

j 100 and 1 hundredth = _____

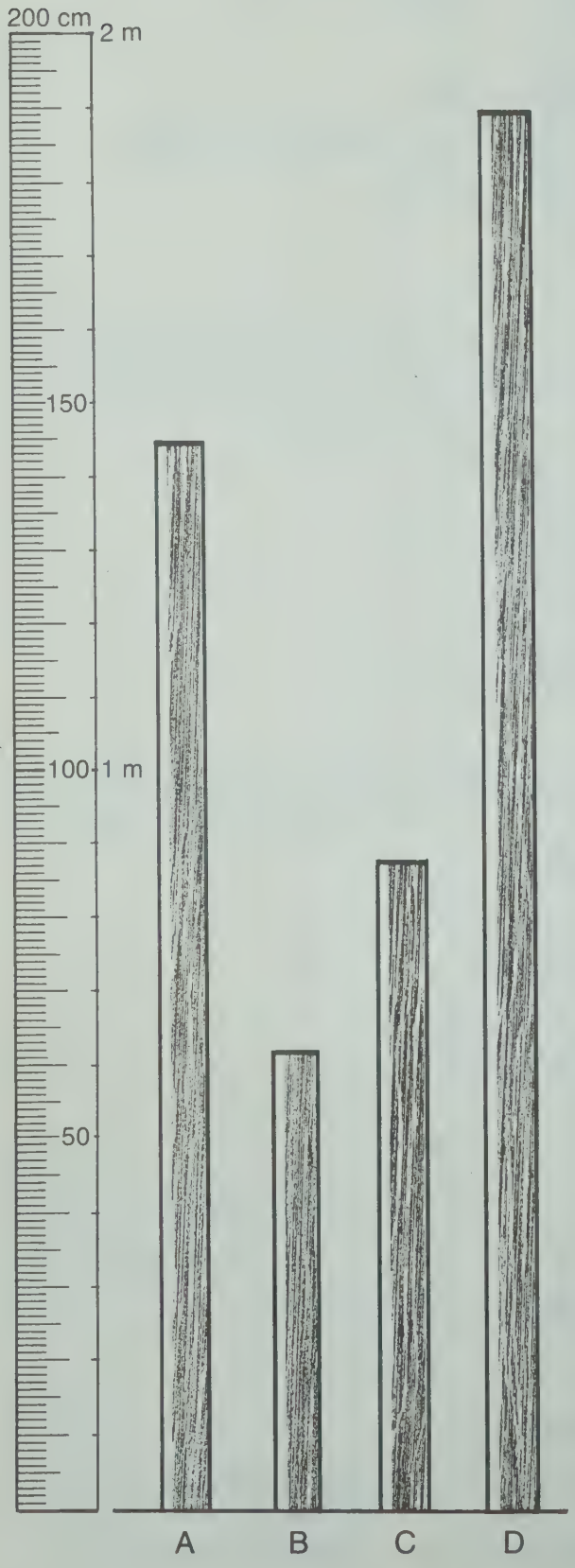
4. Express the following measures in metres, using decimals.

a 102 cm = _____ **b** 14 cm = _____ **c** 236 cm = _____ **d** 1528 cm = _____

e 193 cm = _____ **f** 9 cm = _____ **g** 45 cm = _____ **h** 3500 cm = _____

Decimals to Hundredths: Measurement

Practice



1. Use the figure on the left. Measure the height of each pole to the nearest centimetre. Express each height in metres using a decimal.

a _____

b _____

c _____

d _____

2. Measure the following lengths in your classroom using your metre-stick. Express your measures in: cm, m and cm, and m.

a The height of the tallest boy:

____ cm, ____ m and ____ cm, ____ m.

b The width of the chalkboard:

____ cm, ____ m and ____ cm, ____ m.

c The width of the room:

____ cm, ____ m and ____ cm, ____ m.

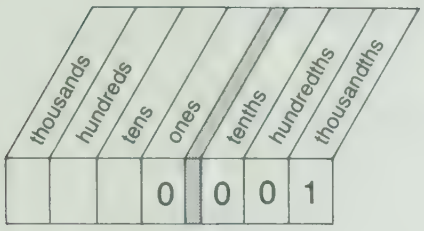
d The length of a desk:

____ cm, ____ m and ____ cm, ____ m.

e The width of a cupboard:

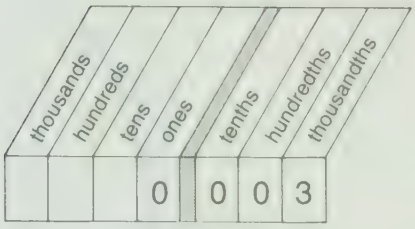
____ cm, ____ m and ____ cm, ____ m.

Writing Decimals to Thousandths



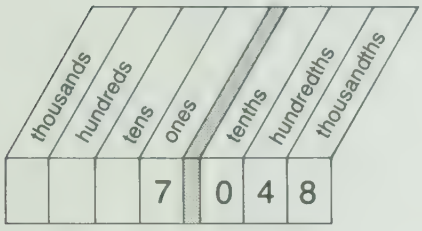
0.001

one thousandth



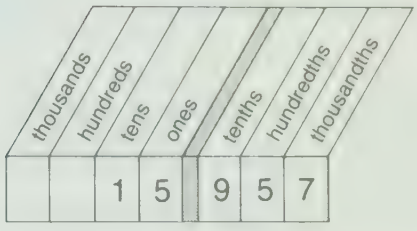
0.003

three thousandths



7.048

seven and forty-eight thousandths



15.957

fifteen and nine hundred fifty-seven thousandths

Practice

1. Write these decimals:

a 8 tens 6 ones 2 tenths 4 hundredths 1 thousandth _____

b 2 tens 3 ones 7 thousandths _____

c 5 thousands 2 hundreds 7 ones 2 tenths 6 thousandths _____

d 6 hundreds 3 tens 4 ones 2 hundredths 8 thousandths _____

e 8 thousands 9 hundreds 6 tens 7 hundredths 8 thousandths _____

f four and forty-one thousandths _____

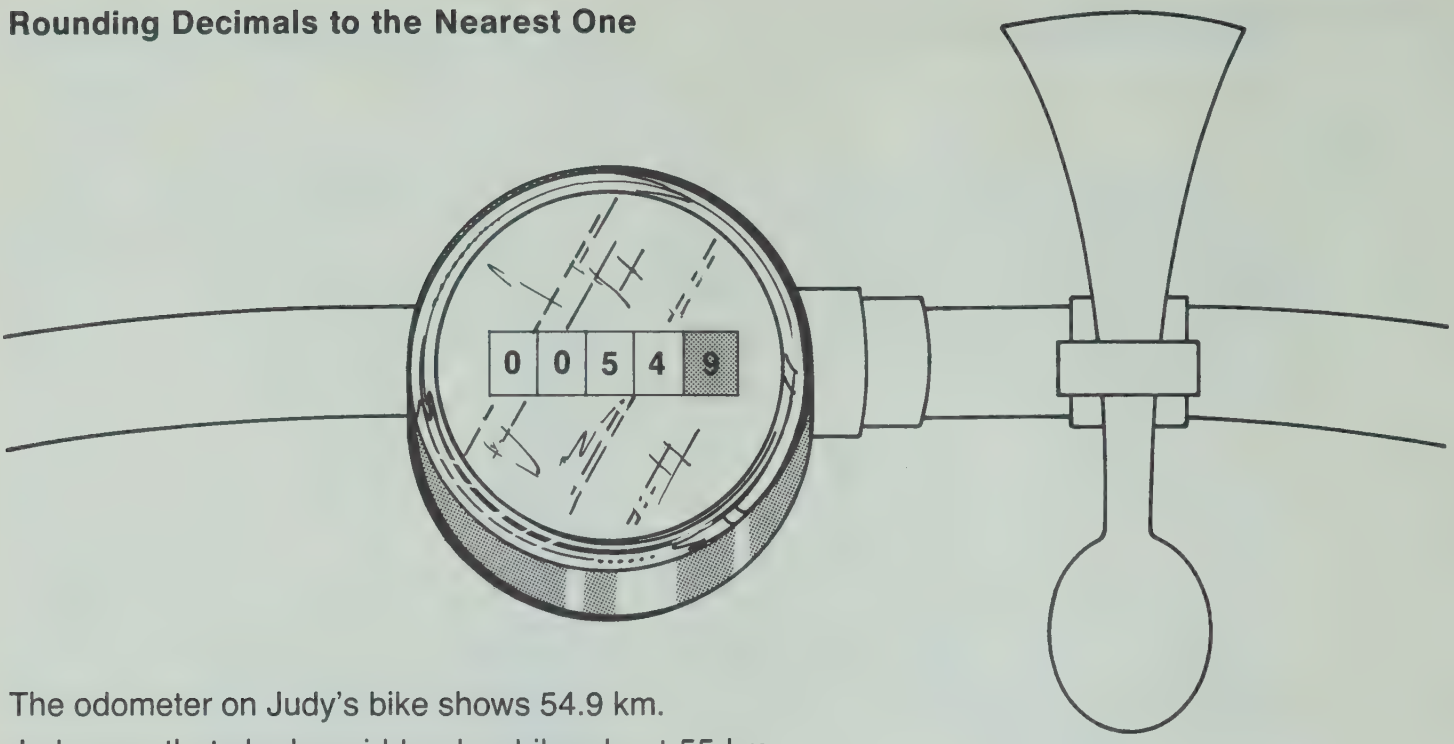
g twenty-eight thousandths _____

h three hundred fourteen thousandths _____

i three and one hundred forty thousandths _____

j thirty-nine and six thousandths _____

Rounding Decimals to the Nearest One



The odometer on Judy's bike shows 54.9 km.
Judy says that she has ridden her bike about 55 km.
She rounded off 54.9 to the nearest one.

Round 2.8, 14.1, and 6.5 to the nearest one.

1. 2.8

2.8 is between 2 and 3.
2.8 is nearer 3 than 2.
The key digit is 8.
2.8 rounds to 3. 3

2. 14.1

14.1 is between 14 and 15.
14.1 is nearer 14 than 15.
The key digit is 1.
14.1 rounds to 14. 14

3. 6.5

6.5 is halfway between 6 and 7.
The key digit is 5.
6.5 rounds to 7. 7

4. Try these. Round each decimal to the nearest one.

a 9.4 ____ **b** 35.7 ____ **c** 2.54 ____ **d** 8.557 ____ **e** 5.3 ____

f 18.9 ____ **g** 3.67 ____ **h** 7.5 ____ **i** 96.5 ____ **j** 15.27 ____

Rounding Decimals to the Nearest Tenth

Round 6.18, 0.82, and 2.35 to the nearest tenth.

1. 6.18

6.18 is between 6.1 and 6.2.
6.18 is nearer 6.2 than 6.1.
The key digit is 8.
6.18 rounds to 6.2. 6.2

2. 0.82

0.82 is between 0.8 and 0.9.
0.82 is nearer 0.8 than 0.9.
The key digit is 2.
0.82 rounds to 0.8. 0.8

3. 2.35

2.35 is halfway between 2.3 and 2.4.
The key digit is 5.
2.35 rounds to 2.4. 2.4

4. Try these. Round each decimal to the nearest tenth.

a 0.41 ____ **b** 4.57 ____ **c** 0.125 ____ **d** 228.222 ____ **e** 0.65 ____

f 5.32 ____ **g** 18.35 ____ **h** 0.29 ____ **i** 0.66 ____ **j** 12.732 ____

Rounding Decimals to the Nearest Hundredth

Round 2.387, 0.264, and 15.735 to the nearest hundredth.

1. 2.387

2.387 is between 2.38 and 2.39.
2.387 is nearer 2.39 than 2.38.
The key digit is 7.
2.387 rounds to 2.39. 2.39

2. 0.264

0.264 is between 0.26 and 0.27.
0.264 is nearer 0.26 than 0.27.
The key digit is 4.
0.264 rounds to 0.26. 0.26

3. 15.735

15.735 is halfway between 15.73 and 15.74.
The key digit is 5.
15.735 rounds to 15.74. 15.74

4. Try these. Round each decimal to the nearest hundredth.

a 0.837 ____ **b** 12.006 ____ **c** 20.032 ____ **d** 5.555 ____ **e** 0.252 ____

f 8.004 ____ **g** 0.009 ____ **h** 1.365 ____ **i** 3.178 ____ **j** 0.002 ____

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